Alaska Outer Continental Shelf

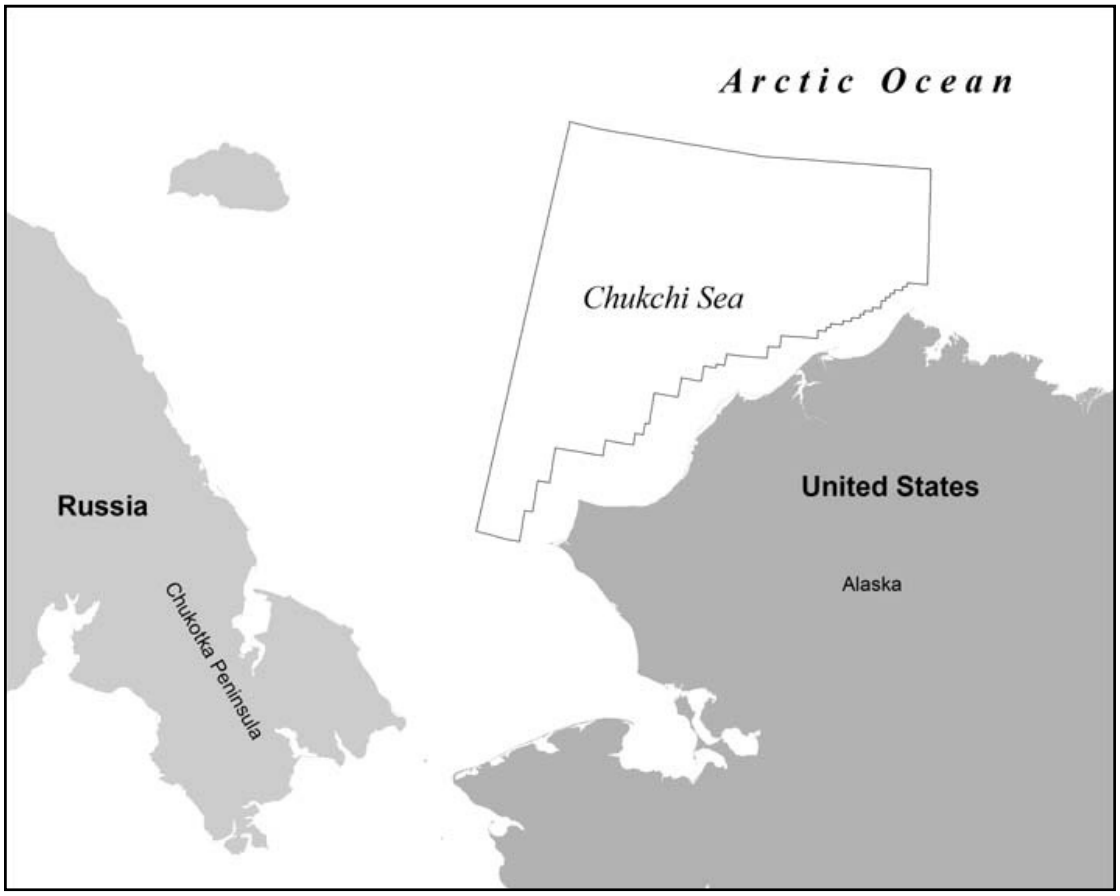
OCS EIS/EA
BOEM 2014-669

Chukchi Sea Planning Area

Oil and Gas Lease Sale 193
In the Chukchi Sea, Alaska

Final Second Supplemental Environmental Impact Statement

Volume 2. Appendices A, B, C, D, E, and F



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Prepared by
Bureau of Ocean Energy Management
Alaska OCS Region

Cooperating Agencies
U.S. Department of the Interior
Bureau of Safety and Environmental Compliance
Bureau of Land Management

State of Alaska
Department of Natural Resources
Office of Project Management and Permitting

North Slope Borough

North West Arctic Borough

U.S. Department of the Interior
Bureau of Ocean Energy Management
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APPENDIX A

Accidental Oil Spills and Gas Releases

Information, Models, and Estimates

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Accidental Oil Spills and Gas Releases: Information, Models, and Estimates

BOEM analyzes hypothetical oil spills and gas releases from oil and gas activities and their relative impact to environmental, economic, and sociocultural resources and resource areas and the coastline. Each of these hypothetical spills or releases has varying potential to result from offshore oil and gas exploration, development and production in the Leased Area. BOEM makes a set of assumptions that collectively form an oil spill and gas release scenario. This consistent set of scenario information is used to formulate the potential oil spill and gas release effects from oil and gas activities in a consistent and logical manner throughout Chapter 4 and 5 of this Final Second SEIS.

It is not anticipated that oil spills occur as a routine activity. Therefore, oil spills are not considered a routine impact-producing factor (IPF). Oil spills are considered accidental events, and the Clean Water Act and the Oil Pollution Act include both regulatory and liability provisions that are designed to reduce damage to natural resources from oil spills. Therefore oil spills are treated as an accidental IPF. An accident is an unplanned event or sequence of events that results in an undesirable consequence. In this analysis the undesirable consequence is an oil spill or gas release in the environment.

This appendix refers to the Lease Sale 193 FEIS, Appendix A and the Lease Sale193 Final SEIS, Appendix B as well as new circumstances or information relevant to concerns that have become available since the publication of the Lease Sale 193 Final SEIS. Much of the new information herein builds from the Scenario discussed in Sections 2.3 and 4.1.1, and Appendix B.

This Appendix discusses the technical information used to estimate a set of assumptions for purposes of oil spill or gas release analysis over the entire life of the Scenario. The information about these accidental oil spills or gas releases includes:

- Estimates of the sources of accidental spills or gas releases that may occur
- How many spills or releases occur and their chance of occurring
- Spill sizes
- Locations to which large spills might travel due to the effects of winds, currents and ice
- How long it may take large spills to travel
- Length of coastline affected by large offshore spills
- How oil spills might weather and the fate of spills
- The likelihood of one or more offshore large spills occurring and contacting locations of environmental, social or economic resources or resources areas

Oil spills are divided into two general spill-size categories and two general phases of operations. These divisions reflect a difference in how the information about the spills is derived and used. The two general activity categories considered in oil-spill analysis are:

- Exploration and delineation
- Development, production and decommissioning

The two general spill-size categories considered in oil-spill analysis are:

- Small spills, those less than less than (<) 1,000 barrels (bbl)
- Large spills, those greater than or equal to (≥) 1,000 bbl, meaning that 1,000 bbl is the minimum threshold size for a large spill.

- A subset of large oil spills is called very large oil spills (VLOS), which are spills (≥) 150,000 bbl.

A small spill (<1,000 bbl) would not be expected to persist on the water long enough for the model to follow its path in a trajectory analysis. Therefore, for small spills, BOEM estimates the type of oil and the number and size of a spill(s).

Large spills are those spills that are ≥1,000 bbl and would persist on the water long enough for the model to follow its path in a trajectory analysis. To judge the effect of a large oil spill, BOEM estimates information regarding the general source(s) of a large oil spill (such as a pipeline, platform or well), the location and size of the spill, the type and chemistry of the oil, how the oil will weather (naturally degrade in the environment), how long it will remain prior to naturally degrading, and where it may go. BOEM also estimates the mean number of large spills and the chance of one or more large spills occurring over the exploration, development and production life of the Scenario. BOEM simulates the paths (trajectories) that large oil spills could take to estimate the chance of a large spill contacting a specific portion of shoreline or offshore resource area and BOEM combines the chance of a spill contacting a portion of shoreline or resource area with the chance of one or more large spills occurring at all to estimate the chance of one or more large spills both occurring and contacting a shoreline or offshore resource area over the life of the scenario.

Estimating large oil-spill occurrence or large oil-spill contact is an exercise in mathematical probability. Uncertainty exists regarding whether exploration or development will occur at all and, if it does, the location, number, and size of potential large oil spill(s) and the wind, ice, and current conditions at the time of a spill(s). Although some of the uncertainty reflects incomplete or imperfect data, a considerable amount of uncertainty exists simply because it is difficult to predict events 15-77 years into the future.

A VLOS is analyzed separately from large oil spills due to its lower level of probability. The technical analysis of a VLOS event is meant to assist BOEM in evaluating low-probability, high-impact events. The scenario and impacts discussed for a VLOS analysis should not be confused with the scenario and impacts anticipated to result from routine activities or from accidental events related to the proposed action or its alternatives. This is due to the very low mathematical frequency associated with VLOS events.

BOEM describes the rationale for the assumptions used in oil-spill analyses in the following subsections. The rationale for the assumptions is a mixture of project-specific information, modeling results, statistical analysis, three decades of experience modeling hypothetical oil spills, and professional judgment.

In this Appendix, the information, models, and assumptions about large spills are discussed in Sections 1 through 4. Small spills are discussed in Section 5. Gas releases are discussed in Section 6. Section 7 discusses Very Large Oil Spills and Section 8 discusses Alaska North Slope spill rates and cumulative large oil spills.

A-1. Accidental Large Oil Spills

To set a reference framework under which the analysis of large oil spills occurs, the following discussion provides the context for the sources of oil in the sea.

With the exception of rare events like the Deepwater Horizon (DWH), the discharges of oil in the sea have declined over the years, even though petroleum consumption is increasing (USDHS, USCG, 2011a, b; USEIA, 2014). Possible causes for the decline in oil discharges include passage of the Oil Pollution Act of 1990 (OPA 90), technology improvements, and implementation of safety-management systems that put into practice risk-reduction interventions.

Between 1971 and 2013, Outer Continental Shelf (OCS) operators produced almost 18 billion barrels (Bbbl) of oil. During this period (excluding the DWH spill which is a rare event) there were 2,844 spills ≥ 1 barrel that totaled approximately 174,000 bbl spilled. This equals 0.001% of the total bbl of oil produced during that period, or about 1 barrel spilled for every 103,200 bbl produced. This record has improved over time. During the more recent period between 1999 and 2013, almost 8.0 Bbbl of oil were produced and there were 645 spills that totaled approximately 39,000 bbl spilled. This is equal to 0.0005% of the total of bbl of oil produced, or approximately 1 barrel spilled for every 204,700 bbl produced. For typical OCS oil spills, the record of OCS oil spills into the environment is improving.

The inclusion of rare events like the DWH spill in the record requires sophisticated analysis due to the small number of events. For the 37 year period ending in 2009 the U.S. Coast Guard (USCG) noted that the DWH volume is 86% of all discharges by volume recorded for U.S. waters in the preceding 37 years (USCG, 2012). These rare events are small in number and are not well handled with the use of standard statistics such as average probabilities. Several recent papers and analyses have identified various methods for estimating the frequency of these rare events (Abimbola, Khan and Khakzad, 2014; Ji, Johnson, and Wikel, 2014; Khakzad, Khan, and Paltrinieri, 2014; USDOI, BOEM, 2012a; Figure 4.3.3-1). The mathematical analysis of very large spills like the DWH spill is detailed in Section 7.

A-1.1. Large Spill Size, Source, and Oil-Type Assumptions

Table A.1 1 shows the general size categories, source of a spill(s), type of oil, size of spill(s) in bbl, and the receiving environment BOEM assumes in the analysis of oil-spill effects in Section 4.3 of this Second SEIS for the Leased Area, Alternatives I, III or IV.

A-1.2. Large Oil-Spill Sizes

Large spills have a minimum size, or threshold value of 1,000 bbl, but the spill size could be larger. Table A.1-1 shows the assumed large spill sizes and the sections within this Second SEIS where BOEM analyzes the effects of large spill(s) for the Leased Area.

The large spill-size assumptions BOEM uses are based on the reported spills in the Gulf of Mexico and Pacific OCS because no large spills (≥ 1,000 bbl) have occurred on the Alaska OCS from oil and gas activities. BOEM uses the median OCS spill size as the likely large spill size (Anderson, Mayes, and LaBelle, 2012) because it is the most probable size for that spill size category. The Gulf of Mexico and Pacific OCS data show that a large spill most likely would be from a pipeline or a platform. The median size of a crude oil spill ≥1,000 bbl from a pipeline on the OCS over the last 15 years is 1,720 bbl, and the average is 2,771 bbl (Anderson, Mayes, and LaBelle, 2012). The median spill size for a platform on the OCS over the entire record from 1964-2010, is 5,066 bbl, and the average is 395,500 bbl (Anderson, Mayes, and LaBelle, 2012). As previously discussed, outliers such as the DWH spill volume skew the average and the average is not a useful statistical measure. For purposes of this analysis, BOEM uses the median spill size, rounded to the nearest hundred shown below, as the likely large spill sizes.

	Pipeline	Platform
Assumed Large Spill Size (bbl)	1,700	5,100

A-1.2.1. Source and Type of Large Oil Spills

The source is considered the place from which a large oil spill could originate. The sources of large spills are divided generically into production platforms, wells, or pipelines (Anderson, Mayes, and LaBelle, 2012). The places where a large spill could occur are based on the Scenario (Appendix B). Platform sources include spills from wells or from diesel fuel tanks located on platforms. Large offshore pipeline spills include spills from the riser and from the offshore pipeline to the shore.

The types of oil spilled from platform spills are assumed to be crude oil, natural gas liquid condensate, or diesel oil. Large oil pipeline spills are assumed to be natural gas liquid condensate or crude oil.

The type of crude oil used in this analysis is Alpine composite. It is known that crude oils vary in properties and that crude oil spills behave in different ways based on their properties. The crude oil analysis considered a light crude oil. Crude oil samples recovered from wells onshore the Alaska North Slope (ANS) and offshore Beaufort and Chukchi seas are characterized by a range of American Petroleum Institute (API) gravity, which is a measure of how heavy or light the oil is compared to water. The crude oils in the Chukchi Sea are estimated to be lighter than crude oil in the Beaufort Sea. Given the existing information from crude oil samples recovered from Alaska wells, the Chukchi Sea oil seems to be characterized as relatively low sulfur (less than 18%), high-gravity (≥ 35º) API crude oil (Sherwood et al., 1998:129). BOEM looked for data on ANS crude oils with similar API gravity values that also had laboratory data on their rate of weathering (natural decomposition). Alpine composite crude oil has an API gravity of 35º and was chosen to be representative for the oil-weathering simulations used in this analysis. BOEM chose a standard diesel oil and a condensate with an API gravity of 50º for the weathering simulations.

A-1.2.2. Historical Loss of Well-Control Incidents on the OCS, Alaska North Slope and North Sea

The 2007 FEIS, Appendix A, Section A.1.c and the 2011 SEIS, Appendix B, Section 1.1 discussed OCS Well Control Incidents including their frequencies. USDOI, BOEM (2011; Appendix A, 2012a; Figure 4.3.3-1.), USDOI, BLM (2012; Appendix G), IAOGP (2010), Bercha Group Inc. (2014a) and Ji, Johnson, and Wikel (2014) detail the loss of well control (LOWC) incidents on the OCS, ANS and North Sea, and discuss the analysis of their frequencies. The loss of well control occurrence frequencies, per well, are on the order of 10^{-3} to 10^{-6}. The occurrence frequencies depend upon the operation or activity, whether the LOWC was a blowout or well release, and whether there was oil spilled.

In general, historical data show that LOWC events escalating into blowouts and resulting in oil spills are infrequent and that those resulting in large accidental oil spills are even rarer events (Anderson, Mayes, and LaBelle, 2012; Bercha, 2014a, Izon et al. 2007, Ji, Johnson, and Wikel, 2014; Robertson et al., 2013; USDOI, BOEM, 2011; USDOI, BOEM, 2012a). From 1964 to 2010 there were 283 well control incidents, 61 of which resulted in crude or condensate spills (USDOI, BOEM, 2012a; Table 4.3.3 1). From 1971 to 2010, fewer than 50 well control incidents occurred. Excluding the volume from the DWH spill, the total spilled volume was less than 2,000 bbl of crude or condensate. The largest of the 1971-2010 spills was 350 bbl. During that same time period, more than 41,800 wells were drilled on the OCS and almost 16 Bbbl of oil was produced.

When considering exploration wells, few of them involve loss-of-well-control incidents and even fewer result in a spill. From 1971-2010 Industry drilled 223 exploration wells in the Pacific OCS, 46 in the Atlantic OCS, 15,138 in the Gulf of Mexico OCS, and 84 in the Alaska OCS, for a total of 15,491 exploration wells. During this period, there were 77 well control incidents associated with exploration drilling. Of those 77 well control incidents, 14 (18%) resulted in oil spills ranging from 0.5 bbl to 200 bbl, for a total 354 bbls, excluding the estimated volume from the DWH spill. These statistics show that, while approximately 15,000 exploration wells were drilled, there were a total of 15 loss-of-well-control events that resulted in a spill of any size: 14 were small spills and one was a large spill (≥1,000 bbl) that resulted in a blowout. That one large/very large spill was the DWH.

The Norwegian SINTEF Offshore Blowout Database, where risk-comparable drilling operations are analyzed and where worldwide offshore oil and gas blowouts are tracked, supports the conclusion that blowouts are rare events (IAOGP 2010; DNV 2010a, b; DNV 2011). Blowout frequency analyses of the SINTEF database suggest that the highest risk operations are associated with exploration drilling

in high–pressure, high-temperature conditions (DNV 2010a, b; DNV 2011). Prior to the DWH event, the three largest blowout spills on the OCS were 80,000 bbls, 65,000 bbls, and 53,000 bbls from production wells, all of which occurred before 1971 (Anderson, Mayes, and LaBelle, 2012). New drilling regulations and recent advances in containment technology that were implemented after the DWH spill may further reduce the frequency and size of oil spills from OCS operations (DNV 2010a, b; DNV 2011). However, as the 2010 DWH spill illustrated, there is a very small chance for a very large oil spill to occur and to result in unacceptable impacts (U.S. CSB, 2014).

A-1.2.3. Historical Exploration Spills on the Beaufort and Chukchi OCS

The Lease Sale 193 FEIS, Appendix A, Section A.1.d discussed historical Arctic OCS exploration spills through 2006 which have all been small (less than 20 bbl). On the Beaufort and Chukchi OCS through 2003, the oil industry drilled 35 exploration wells to depth, spilled approximately 27 bbls and 24 bbls were recovered (Table A.1-2). Since 2003, there have been no wells drilled to total depth in the Alaska OCS. In 2012, only two top holes were drilled and the operator was not allowed to drill into a hydrocarbon zone. During the 2012 exploration drilling activities, no spills of 1 barrel or more (BSEE reportable quantities) occurred on the Arctic OCS. Only tiny spills (drips and drops) of hydraulic lube oil and gasoline for activities associated with the exploration program on the Arctic OCS were reported to the agencies and the National Response Center (NRC).

A-1.2.4. Historical Exploration Well-Control Incidents on the Alaska North Slope and Surrounding Area

No exploratory drilling LOWC incidents have occurred on the Alaskan OCS while drilling 84 wells to depth. One exploration drilling blowout of gas occurred on the Canadian Beaufort Sea. Up to 1990, 85 exploratory wells were drilled in the Canadian Beaufort Sea, and one shallow-gas blowout occurred. A second incident was not included at the Amaluligak wellsite with the Molikpaq drill platform because it did not qualify as a blowout by the definition used in other databases. In that incident, there was a gas flow through the diverter, with some leakage around the flange (Devon Canada Corporation, 2004).

Since the Lease Sale 193 SEIS, one gas blowout occurred on the ANS. On February 15, 2012, Repsol had a blowout from an exploration well on the Qugruk #2 pad (Q2 pad), on the Colville River Delta, approximately 18 miles northeast of Nuiqsut and approximately 150 miles southeast of Barrow (70° 27’ 19” N, 150° 44’ 52” W). The blowout from a shallow gas pocket released an unknown quantity of gas and approximately 42,000 gallons (gal) (1,000 bbl) of drilling mud (ADEC, 2012). The well ceased flowing on February 16, 2012. Of the 11 blowouts on the ANS, 10 were gas and 1 was oil. The one oil blowout was from drilling in the 1950s, which would not be relevant by today’s regulatory standards.

A-2. Behavior and Fate of Crude Oils

There are scientific laboratory data and field information from accidental and research oil spills about the behavior and fate of crude oils. The Lease Sale 193 FEIS, Appendix A, Section 2.1 discussed the behavior and fate of oil and is herein incorporated by reference and summarized below. BOEM discusses the background information on the fate and behavior of oil in Arctic environments and its behavior and persistence properties along various types of shorelines. BOEM also make several assumptions about oil weathering to perform modeling simulations of oil weathering that is specific to the large spills BOEM estimates for analysis purposes.

A-2.1. Generalized Processes Affecting the Fate and Behavior of Oil

Several processes alter the chemical and physical characteristics and toxicity of spilled oil. Collectively, these processes are referred to as weathering or aging of the oil. The major oil-

weathering processes are spreading, evaporation, dispersion, dissolution, emulsification, microbial degradation, photochemical oxidation, and sedimentation to the seafloor or stranding on the shoreline (Payne et al., 1987; Boehm, 1987; Lehr, 2001; USDOI, MMS, 2007, Figure A.1-2).

Along with the physical oceanography and meteorology, weathering processes determine the oil's fate in the environment. Potter et al. (2012), Dickens (2011), and Lee et al. (2011) reviewed the state of fate and behavior of oil in ice and documented the relevant studies; some of which were detailed in the Lease Sale 193 FEIS, Appendix A, 2.1. Collectively, 40 years of research underpin the available science on fate and behavior of oil in ice.

Further research on the fate of oil spills and oil dispersants is ongoing. Gong et al. (2014) document the relationships between sediment particle size and concentration, oil properties, and salinity characteristics and their contribution to the formation and characteristics of oil sediment-particulate-material aggregates. Beegle-Krause et al. (2013) reviewed the literature on the fate of either mechanically or chemically dispersed oil under ice and determined that under-ice turbulence was a key variable. Turbulence would tend to keep oil droplets in suspension but is significantly reduced under ice fields and oil droplets do not remain in suspension. Further research is also ongoing within Industry (Mullin, 2014) and government.

The potential volume of oil entrained in the interstitial space of the sea ice crystal fabric was studied using salinity and temperature data from Barrow, Alaska. Petrich, Karlsson, and Eicken (2013) found oil entrainment increases from January to May. Entrainment may reach approximately 20% of the potential oil volume pooled beneath sea ice.

Fingas and Hollebone (2014) conclude that the behavior of oil in ice can be modeled based on the previous research. However, they stress that new available technologies for measurement have the potential to move the science forward. Initial studies suggest oil spreads differently when spilled in young ice (frazil, nilas, or pancake). Wilkinson et al. (2014) documented oil penetrating frazil ice and frazil ice inhibiting brine channel migration. Waves were a controlling factor in the spread of oil associated with young ice.

Within Arctic waters and sea ice brine channels, there are natural indigenous microbial organisms. McFarlin et al. (2011a; b; 2014) studied crude oil biodegradation under cold and light-limiting conditions using indigenous microbes collected from the Beaufort and Chukchi seas. Biodegradation occurred down to -1^{o} C. The results by Bagi et al. (2013) also suggest that biodegradation capacity in cold seawater is not necessarily inherently lower than the biodegradation capacity of microbes in temperate seawater.

A-2.2. Oil-Spill Persistence

How long an oil spill persists on water or on the shoreline can vary widely, depending on the size of the oil spill, the environmental conditions at the time of the spill, and the substrate of the shoreline and, in the case of the U.S. Chukchi and Beaufort seas, whether the shoreline is eroding. Persistence on water and then on shorelines is discussed below.

A-2.2.1. On-Water Oil-Spill Persistence

In this analysis, BOEM conservatively assumes 1,700- and 5,100-bbl crude oil spills could last up to 30 days on the water as a coherent slick. After that, the weathering process mentioned in Section 2.1 above would degrade the oil on the surface of the water, making it hard to track. During higher wind speeds and wave heights, spills may dissipate more quickly. For spills that freeze into sea ice, spills are assumed to persist up to 30 days after melting out from the sea ice.

A-2.2.2. Shoreline Type, Oil Behavior, and Persistence

A new shorezone analysis was completed in 2014 and BOEM compiled the new Environmental Sensitivity Information (ESI) for each of the land segments along the northern coast of Alaska (Harper and Morris, 2014). For each land segment, the percentage of each ESI type by length is shown in Table A.1-3. In general, the higher the ESI number, the longer the oil is estimated to persist in that type of substrate.

A-2.2.3. Oil-Spill Toxicity

Oil-spill toxicity occurs through the mode of narcosis (state of stupor or unconsciousness) caused by monocyclic aromatic hydrocarbons crossing the cell membranes as well as oil being ingested by or coating an organism. Studies on the Exxon Valdez Oil Spill in Prince William Sound revealed that larger and more persistent PAHs in sediments are linked to long-term effects (Peterson et al., 2003). Shorelines with higher ESI values likely will have longer oil persistence in the sediments. Oil-spill toxicity is discussed in the effects of spills on each resource section.

Additional studies, from the Deepwater Horizon, examining dispersant use were recently published. Rico-Martinez, Snell, and Shearer (2013) found that toxicity testing with various species of marine rotifer revealed that, when the dispersant COREXIT 9500A (which was used during the DWH spill to disperse the oil in an attempt to reduce its toxicity) was well mixed with crude oil, the toxicity increased as much as 52-fold. Without mixing, the effect was decreased to 27.6 fold. The authors noted that the rotifer strain from the Gulf of Mexico was most tolerant to oil from the Macondo well. The authors described the effect as synergistic. However, other authors have noted that the increased toxicity of COREXIT 9500A plus crude oil is actually due to the oil itself (Wu et al., 2012) because the dispersant helps the oil dissolve into the water phase and then become more bioavailable. Furthermore, Chakraborty et al. (2012) found that COREXIT 9500 was not toxic to indigenous microbes and that various components of the COREXIT 9500 were degraded. This is part of the ongoing debate that exists with the use of dispersants as a response tool. Dispersants help make the oil more bioavailable so that the oil is subject to increased degradation, including biodegradation; however, oil that is more bioavailable may also be more toxic to some species.

Gardner et al. (2013) and deHoop et al. (2011) studied the relative sensitivity of cold-water species to oil components and to physically and chemically dispersed oil. In both of these studies, a small number of cold-water species fell within the range of sensitivities of commonly tested species, mostly of temperate climates. Bejarano, Clark, and Coelho (2014) suggest improvements to toxicity testing to make the results useful across species and geographic locations for better information to further management decisions on dispersant use.

A-2.3. Assumptions about Large Oil-Spill Weathering

To run the oil weathering model (OWM) using a consistent framework, several assumptions are made regarding the type of oil, the size of the spill, the environmental conditions, and the location of the spill. The following assumptions are used to estimate weathering of a large oil spill:

- The crude oil properties will be similar to Alpine composite crude oil for the Leased Area
- The condensate oil properties will be similar to a Sliepner condensate for the Leased Area
- The diesel oil properties will be similar to a typical diesel for the Leased Area
- The size of the diesel fuel spill is 5,100 bbls
- The size of the crude or condensate spill(s) is 1,700 or 5,100 bbls
- There is no reduction in the size of spill due to cleanup; instead cleanup is considered separately as either mitigation or disturbance
- The wind, wave, temperature and ice conditions are as described

- The spill is a surface spill or a shallow (less than 50m) subsea spill that reaches the water surface quickly
- Meltout spills occur into 50% ice cover
- The properties predicted by the OWM model are those of the thick part of the slick
- The spill occurs as an instantaneous spill over a short period of time
- The fate and behavior are as modeled (Tables A.1-4 through 8)
- The oil spill persists for up to 30 days in open water

Uncertainties exist, such as:

- The actual size of an oil spill or spills, should they occur
- Whether the spill is instantaneous or chronic
- The location of the spill
- Wind, current, wave, and ice conditions at the time of a possible oil spill
- The crude, diesel or condensate oil properties at the time of a possible spill

A-2.4. Modeling Simulations of Oil Weathering

To judge the effect of a large oil spill, BOEM estimates information regarding how much oil evaporates, how much oil is dispersed, and how much oil remains after a certain time period. BOEM derives the weathering estimates of Alpine composite crude oil, and Sliepner-condensate and diesel fuel from modeling results from the SINTEF Oil Weathering Model (OWM) Version 4.0 (Reed et al., 2005) for up to 30 days.

A-2.4.1. Oils for Analysis

The crude oil used in the analysis is a light crude oil. Alpine oil composite was chosen for simulations of oil weathering for the Leased Area, because it is a light crude oil that falls within the category of 35-40° API oils estimated to occur in the Leased Area. BOEM used a diesel fuel and Sliepner condensate.

A-2.4.2. Alpine Composite, Condensate, And Diesel Fuel Simulations Of Oil Weathering

This section discusses the simulation of oil weathering for OCS median spill sizes 1,700 and 5,100 bbl (Anderson, Mayes, and LaBelle, 2012). BOEM uses the SINTEF OWM to perform simulations of oil weathering. The SINTEF OWM has been tested with results from three full-scale field trials of experimental oil spills (Daling and Strom, 1999; Brandvik et al., 2010).

The simulated Alpine composite crude and the condensate oil-spill sizes are 1,700 bbl or 5,100 bbl. The diesel-oil-spill size is 5,100 bbl. BOEM simulates two general scenarios: one in which the oil spills into open water and one in which the oil freezes into the ice and melts out into 50% ice cover.

For the Leased Area, BOEM assumes open water is June through October, and a winter spill could melt out in July. BOEM assumes the spill starts at the surface or quickly rises to the surface in the shallow waters of the Leased Area. For open water, BOEM models the weathering of the spills as if they are instantaneous spills. For the meltout spill scenario, BOEM models the entire spill volume as an instantaneous spill. Although different amounts of oil could melt out at different times, BOEM took the conservative approach, which was to assume all the oil was released at the same time. BOEM reports the results at the end of 1, 3, 10, and 30 days.

For purposes of analysis, BOEM looks at the mass balance of the large oil spill: how much is evaporated, dispersed, and remaining. Tables A.1-4 through 8 summarizes the results BOEM assumes

for the amount evaporated, dispersed, and remaining for a diesel fuel, condensate or crude oil. The results are considered in BOEM's analysis of the effects of oil on environmental, social and economic resources or resource areas. In general, diesel fuel and condensates will evaporate and disperse in a short period of time (3-10 days). The higher the wind speeds, the more rapidly the evaporation and dispersion occur. Crude oils tend to evaporate and disperse more slowly, especially if the oils become emulsified. Crude oil properties vary, and these are representative ranges of how different light crudes may weather.

The Alpine composite contains a relatively large amount of lower molecular-weight compounds. In weathering tests, approximately 29% and 33% of its original volume evaporated within 1 and 3 days, respectively, at both summer and winter temperatures. Alpine composite will form water-in-oil-emulsion with a maximum water content of 80% at both winter and summer temperatures, yielding approximately five times the original spill volume (Reed et al., 2005). At the average wind speeds over the Leased Area, dispersion is slow, ranging from 0-16% (Tables A.1-7 and 8). However, at higher wind speeds (e.g., 15 m/s wind speed) the oil spill will be almost removed from the sea surface within a day through evaporation and dispersion.

A-3. Estimates of Where a Large Offshore Oil Spill May Go

BOEM studies how and where large offshore spills move by using an oil-spill trajectory model with the capability of assessing the probability of oil-spill contact to environmental resource areas (ERA), known as the Oil-Spill Risk Analysis (OSRA) model (Smith et al., 1982; Ji, Johnson, and Li, 2011). The "Large" oil spill means spills with a threshold size of ≥ 1,000 bbl. This model analyzes the likely paths of over 1.215 million simulated oil spill trajectories in relation to biological, physical, and sociocultural resource areas that BOEM generically calls ERAs. The trajectory is driven by the wind, sea ice, and current data from a coupled ocean-ice model. The locations of environmental resource areas, including sociocultural resource areas, barrier islands, and the coast within the model study area, are used by OSRA to tabulate the percent chance of oil-spill contact to these areas. A full report is found within Li, Johnson and Murphy (2015).

A-3.1. Inputs to the Oil-Spill-Trajectory Model

There are several inputs necessary to run the oil-spill-trajectory model and to assess the probability of oil-spill contact to environmental resource areas, boundary segments, and land segments, including the following:

- Study area
- Arctic seasons
- Location of the coastline
- Location of environmental resource areas
- Location of land segments and grouped land segments
- Location of boundary segments
- Location of hypothetical launch areas
- Location of hypothetical pipelines and transportation assumptions
- Current and ice information from a general circulation model
- Wind information

A-3.1.1. Study Area and Boundary Segments

Map A-1 (Maps are found in section A.1, Tables and Maps) shows the study area used in the oil-spill-trajectory analysis. It extends from 174 º E to 130º W and 66 º N to 75º N. The OSRA model has a

resolution of 0.6 km by 0.6 km and a total of 6 million grid cells in the study area. The study area is formed by 40 offshore boundary segments and the Beaufort (United States and Canada) and Chukchi seas (United States and Russia) coastline. The boundary segments are vulnerable to spills in both Arctic summer and winter. The study area is chosen to be large enough to allow most trajectories of hypothetical oil spills to develop without contacting the boundary segments through as long as 360 days.

A-3.1.2. Trajectory Analysis Periods

The OSRA model launches a hypothetical oil-spill trajectory from a hypothetical location called a launch point (described in detail in Section 3.1.5) starting on day 1 in 1986, and it continuously launches the trajectory every other day for a total of 18 years (1986-2004). Therefore, a total of 3,240 trajectories are launched over this time period. The trajectories are driven by the three-hourly wind, current and ice data from a coupled ocean-ice model with 20 years (1985-2005) of simulation (described in detail in section 3.1.6; Curchitser et al., 2013), and are computed on an hourly basis. Note that data from 1985 are not used in the trajectory analysis because they do not start on January 1st.

BOEM defines three time periods for the trajectory analysis of large oil spills. These periods are the months when trajectories are started and the chance of contact is tabulated. BOEM calls these three periods annual, summer, and winter. Shown below are the three time periods that trajectories were started and the months that make them up.

Sale Area	Annual	Summer	Winter
Leased Area	January-December	June 1-October 31	November 1-May 31

The annual period is from January 1 to December 30. The summer period is from June 1 through October 31 and generally represents open water or Arctic summer. The winter period is from November 1 through May 31 and represents ice cover or Arctic winter. The choice of this seasonal division was based on meteorological, climatological, and biological cycles and consultation with Alaska OCS Region analysts.

A-3.1.3. Locations of Environmental Resource Areas

Environmental resource areas (ERAs) represent areas of social, economic, or biological resources or resource areas. BOEM, Alaska OCS Region analysts designate these ERAs. The analysts work with specialists in other federal and state agencies, academia and various stakeholders who provide information about these resources. The analysts also designate in which months these ERAs are vulnerable to spills, meaning the time period those resources occupy or use that spatial location. For example, birds migrate and may be there only from May to October.

There are 124 ERAs. Maps A-2a, A-2b, A-2c, A-2d, A-2e and A-2f show the location of the 124 ERAs. These resource areas represent concentrations of wildlife, habitat, subsistence-hunting areas, and subsurface habitats. The names or abbreviations of the ERAs and the general resource they represent are shown in Table A.1-9. Information regarding the general and specific ERAs for birds, whales, subsistence resources, marine mammals, fish, and lower trophic resources is found in Tables A.1-10, 11, 12, 13, 14, 15 and 16, respectively. Terrestrial mammals are not represented by ERAs but are represented by Grouped Land Segments (GLSs) shown in Table A.1-17 and discussed below. BOEM also includes Land as an additional environmental resource area (ERA). Land is the entire study area coastline and is made up of all the individual land segments (LSs) 1 through 132, which are described below.

A-3.1.4. Location of Land Segments and Grouped Land Segments

The coastline was further analyzed by dividing the Chukchi (United States and Russia) and Beaufort (United States and Canada) seas coastline into 132 LSs. Some LSs were added together to form larger geographic areas and were called GLSs.

The LS identification numbers (IDs) and the geographic place names within the LS are shown in Table A.1-18. Maps A-3a, A-3b, and A-3c show the location of these 132 LSs. Land segments are vulnerable to spills in both Arctic summer and winter. The GLSs, their names, and the individual LSs that make them up are shown in Table A.1-19. Maps A-4a, A-4b, and A-4c show the location of these 46 GLSs. Grouped land segments are vulnerable to spills based on the time periods shown in Table A.1-19.

A-3.1.5. Location of Proposed and Alternative Hypothetical Launch Areas and Hypothetical Pipeline Segments

BOEM has information regarding where companies leased blocks in Lease Sale 193. For this analysis, the launch areas (LAs) and pipeline segments (PLs) are hypothetical locations which have been reduced to the Leased Area. They are not meant to represent or suggest any particular development scenario. If and when any commercial hydrocarbons are discovered, detailed development scenarios would be engineered, designed, reviewed, and evaluated by both industry and BSEE, BOEM and other applicable regulatory agencies.

Map A-5 shows the location of the six hypothetical LAs (1, 4, 5, 6, 10, and 11) and six hypothetical PLs (2, 3, 5, 6, 8, and 9) where large oil spills could originate if they were to occur. Pipeline locations are entirely hypothetical. They are not meant to represent three proposed pipelines or any real or planned pipeline locations. They are spaced along the coast to evaluate differences in oil-spill trajectories from different locations along the coast.

Hypothetical launch points were spaced at one-seventh-degree intervals in the north-south direction (about 15.86 km) and one-third-degree intervals in the east-west direction (about 12.67 km). At this resolution, there were 375 total launch points in space, grouped into the six LAs (1, 4, 5, 6, 10, and 11) and six PLs (2, 3, 5, 6, 8, and 9) representing the Leased Area. Pipelines 2, 5 and 8 are offshore PL segments and PLs 3, 6 and 9 are nearshore PLs.

A total of 3,240 trajectories were simulated from each of 375 launch points over the 18 years of wind, current and ice data, for a total of 1.215 million trajectories. The results of these trajectory simulations were combined to represent platform/well spills from 6 LAs (Map A-5). Launch Area 1 is >150 mi offshore. Launch Areas 4-6 are approximately 90-150 mi offshore. Launch Areas 10-11 are approximately 25-90 mi offshore. Pipeline spills were represented by trajectories from each launch point along each PL (2, 3, 5, 6, 8, and 9, Map A-5).

For the Leased Area Alternatives I, III, or IV, BOEM assumes no large oil spills occur during exploration activities. Development/production activities for the Leased Area could occur in any of the LAs (1, 4, 5, 6, 10, and 11) or along any of the PL (2, 3, 5, 6, 8, and 9). Table A.1-20 shows the assumptions about how the hypothetical launch areas were assumed to be serviced by hypothetical pipelines.

A-3.1.6. Ocean Current and Ice Information from a General Circulation Model

BOEM uses the results from a new coupled ice-ocean general circulation model to simulate oil-spill trajectories. The wind-driven and density-induced ocean-flow fields and the ice-motion fields are simulated using a three-dimensional, coupled, ice-ocean hydrodynamic model (Curchitser et al., 2013). The model is based on the Regional Ocean Modeling System (ROMS) (Shcheptkin and

McWilliams, 2005). The ROMS has been coupled to a sea ice model (Budgell, 2005), which consists of elastic-viscous-plastic rheology (Hunke and Dukowics, 1997; Hunke, 2001) and the Mellor and Kantha (1989) thermodynamics. This model simulates flow properties and sea-ice evolution for the Arctic with enhanced resolution (5km) in the Chukchi and Beaufort seas during the years 1985-2005. The sea ice model was adapted to represent landfast ice, which occurs on the Chukchi Sea coast. The coupled ocean-ice model uses six-hourly CORE2 forcing files (Large and Yeager, 2009), including winds, air temperature, air pressure and humidity, plus daily solar radiation to compute the momentum, heat and salt fluxes. Comparison of model results with observation shows significant skill in the model capability to reproduce observed circulation and sea ice patterns in the Beaufort and Chukchi seas (Curchitser et al., 2013).

A-3.1.7. Wind Information

BOEM uses the reanalysis (1986-2004) wind fields provided by Curchitser et al. (2013). The wind data are from CORE2 (Large and Yeager, 2009) and was interpolated to the coupled ocean model grid at three-hourly intervals.

A-3.1.8. Large Oil-Spill-Release Scenario

For purposes of this trajectory simulation, all spills occur instantaneously. For each trajectory simulation, the start time for the first trajectory was the first day of the season (winter or summer) of the first year of wind data (1986) at 6 a.m. Greenwich Mean Time (GMT). The summer season consists of June 1-October 31, and the winter season is November 1-May 31. Each subsequent trajectory was started every 2 days at 6 a.m. GMT.

A-3.2. Oil-Spill-Trajectory Model Assumptions

The oil-spill-trajectory model assumptions are as follows:

- Large oil spills occur in the hypothetical launch areas or along hypothetical pipeline segments
- Operators transport the produced oil through pipelines
- A large oil spill reaches the water surface
- Large oil spills persist long enough for trajectory modeling for up to 360 days if they are encapsulated in ice and melt out
- A large oil spill encapsulated in the landfast ice does not move until the ice moves or it melts out
- Large oil spills occur and move without consideration of weathering. The oil spills are simulated each as a point with no mass or volume. The weathering of the oil is estimated separately in the stand-alone SINTEF OWM model
- Large oil spills occur and move without any cleanup. The model does not simulate cleanup scenarios. The oil-spill trajectories move as though no booms, skimmers, or any other response action is taken
- Large oil spills stop when they contact the mainland coastline, but not the offshore barrier islands in Stefansson Sound

Uncertainties exist, such as:

- the actual size of the large oil spill or spills, should they occur
- whether the large spill reaches the water
- whether the large spill is instantaneous or a long-term leak
- the wind, current, and ice conditions at the time of a possible large oil spill

- how effective response or cleanup is
- the characteristics of crude, condensate or diesel oil at the time of the large spill
- how Alpine composite crude, condensate or diesel oil will spread
- whether or not development and production occurs

A-3.3. Oil-Spill-Trajectory Simulation

The trajectory-simulation portion of the OSRA model consists of many hypothetical oil-spill trajectories that collectively represent the mean surface transport and the variability of the surface transport as a function of time and space. The trajectories represent the Lagrangian motion that a particle on the surface might take under given wind, ice, and ocean-current conditions. Thousands of trajectories are simulated to give a statistical representation, over time and space, of possible transport under the range of wind, ice, and ocean-current conditions that exist in the OSRA study area.

Trajectories are constructed to produce an oil-transport vector. For cases where the ice concentration is below 80%, each trajectory is constructed using vector addition of the ocean current field and 3.5% of the instantaneous wind field—a method based on work done by Huang and Monastero (1982), Smith et al. (1982), and Stolzenbach et al. (1977). For cases where the ice concentration is 80% or greater, the model ice velocity is used to transport the oil. Equations 1 and 2 show the components of motion that are simulated and used to describe the oil transport for each trajectory:

1. $U_{oil} = U_{current} + 0.035\ U_{wind}$ or
2. $U_{oil} = U_{ice}$

Where:

U_{oil} = oil drift vector

$U_{current}$ = current vector (when ice concentration is <80%)

U_{wind} = wind speed at 10 m above the sea surface

U_{ice} = ice vector (when ice concentration is ≥ 80%)

The wind-drift factor was estimated to be 0.035, with a variable drift angle ranging from 0º-25º clockwise. The drift angle was computed as a function of wind speed according to the formula in Samuels, Huang, and Amstutz (1982). The drift angle is inversely related to wind speed.

The trajectories age while they are in the water and/or on the ice. For each day that the hypothetical spill is in the water, the spill ages—up to a total of 360 days. While the spill is in the ice (≥ 80% concentration), the aging process is suspended. The maximum time allowed for the transport of oil in the ice is 360 days, after which the trajectory is terminated. After coming out of the ice, that is melting into open water, the trajectory ages to a maximum of 30 days.

A-3.4. Results of the Oil-Spill-Trajectory Model

A-3.4.1. Conditional Probabilities: Definition and Application

The chance that a large oil spill will contact a specific ERA, LS, GLS, or BS within a given time of travel from a certain location (LA or PL) is termed a conditional probability. The condition is that BOEM assumes a large spill occurs. Conditional probabilities assume a large spill has occurred and the transport of the spilled oil depends only on the winds, ice, and ocean currents in the study area. Conditional probabilities are reported for three seasons (annual, summer, and winter) and six time periods (3, 10, 30, 60, 180, and 360 days). Conditional probabilities are expressed as a percent chance. This means that the probability (a fractional number between 0 and 1) is multiplied by 100 and expressed as a percentage.

For the Leased Area, annual, summer, and winter periods are shown in Section 3.1.2. Contact, tabulated from a trajectory that began before the end of summer season, is considered a summer contact. BOEM also estimates the conditional probability of contact from spills that start in winter, freeze into the sea ice, and melt out in spring or summer. Winter contacts are from spills that begin in winter. Therefore, if any contact to an ERA, LS, GLS or BS is made by a trajectory that began by the end of winter, it is considered a winter contact. BOEM also estimates annual conditional probabilities of contact within 3, 10, 30, 60, 180, and 360 days. Annual contact is for a trajectory that began in any month throughout the entire year.

A-3.4.1.1. Conditional Probabilities: Results

The chance of a large spill contacting a specific ERA, LS, GLS, or BS or any of the areas being assessed (assuming a spill has occurred) is called a conditional probability. It is conditioned on the assumption that a large spill has occurred. The conditional probability results for the oil-spill-trajectory model are summarized generally below and are listed in Tables A.2-1 through A.2-72 for the Leased Area. The Maps referenced in this discussion are as follows:

- Boundary Segments (BSs) are shown in Map A-1,
- Environmental Resource Areas (ERAs) are shown in Maps A-2a through A-2f
- Land Segments (LSs) are shown in Maps A-3a through A-3c
- Grouped Land Segments (GLSs) are shown in Maps A-4a through 4c

For specific analysis of conditional probabilities in regard to specific resources, please see Chapter 4.3. The following section provides generalized comparisons for an overall generalized view. Probabilities in the following discussions, unless otherwise noted, are conditional probabilities estimated by the OSRA model (expressed as percent chance) of a spill ≥1,000 bbl in size contacting ERAs and LSs within the days and seasons as specified below.

Comparisons between Spill Location and Season

The primary differences of contact between hypothetical spill locations (LAs and PLs) are geographic in the perspective of west to east or nearshore versus offshore and temporal in terms of how long it takes to contact. Offshore spill locations take longer to contact the coast and nearshore ERAs, if contact occurs at all. Winter spill contact to nearshore and coastal resources is less often and, to a lesser extent, due to the landfast ice in place from November to May. Statistically, hypothetical spills have a westerly and southwesterly direction of drift through time.

General Contacts through Time

3 Days

In general, the contact to individual LSs and ERA Land is due to hypothetical large spills from the nearshore PLs where assumed hypothetical pipelines could come ashore. Annually, there is a <0.5-1% chance of a large spill contacting ERA Land or individual LSs from LAs that begin approximately 25-150 mi offshore from the coast. Annually, spills from hypothetical PLs adjacent to the coast have a <0.5-7% chance of contacting ERA Land. Launch areas or PLs adjacent to or on top of ERAs have the highest percent chance of contact within 3 days.

During the entire year (annual), the OSRA model estimates that a large spill from PLs 3, 6, or 9 has a <0.5-2% chance of contacting individual LSs. Those LSs with conditional probabilities of contact of 1% or greater include LS 65 (Cape Lisburne), 72-75 (Point Lay-Icy Cape), 79-80 (Wainwright-Kugra Bay), or 84-85 (Barrow Area) (Table A.2-7). All other LAs and PLs have a <0.5% chance of contacting individual LSs over the entire year. The OSRA model estimates the chance of contact to ERA Land ranges from 1-7% for LA 11 and PLs 3, 6, or 9 (Table A.2-1). All other LAs and PLs have a <0.5% chance of contact to ERA Land (Table A.2-1).

During summer, the OSRA model estimates that a large spill from PLs 3, 6, or 9 or LA11 has a <0.5-3% chance of contacting individual LSs. Those LSs of 1% or greater include 65 (Cape Lisburne), 72-75 (Point Lay-Icy Cape), 78-80 (Point Collie-Kugra Bay), or 84-85 (Barrow Area) (Table A.2-31). All other LAs and PLs have a <0.5% chance of contacting individual LSs. The OSRA model estimates the chance of contact to ERA Land ranges from 1-12% for LAs 10 or 11, or PLs 3, 6, or 9 (Table A.2-25). Hypothetical nearshore PLs have the highest chance of contact. All other LAs and PLs have a <0.5% chance of contact to ERA Land (Table A.2-25).

During winter, the OSRA model estimates that a large spill from PLs 3, 6 or 9 has a <0.5- 2% chance of contacting individual LSs. Those LSs of 1% or greater include 65 (Cape Lisburne), 72-74 (Point Lay-Kasegaluk Lagoon) or 79-80 (Wainwright-Kugra Bay) (Table A.2-55). All other LAs (both nearshore and offshore) and PLs have a <0.5% chance of contacting individual LSs within 3 days over winter (Table A.2-55). The OSRA model estimates the chance of contact to ERA Land ranges from 2-5% for PLs 3, 6, or 9 (Table A.2-49). All other LAs and PLs have a <0.5% chance of contact to ERA Land (Table A.2-49).

The OSRA model estimates that a large spill, from LAs or PLs adjacent to or on top of ERAs, has the highest percent chance of contact. During the entire year (annual), LAs have a <0.5-39% chance of contacting individual ERAs (Table A.2-1) and PLs have a less than 0.5-57% chance of contacting individual ERAs (Table A.2-1).

During summer, LAs have a <0.5-62% chance of contacting individual ERAs (Table A.2-25) and PLs have a <0.5-≥99% chance of contacting individual ERAs (Table A.2-25).

During winter, LAs have a <0.5-59% chance of contacting individual ERAs (Table A.2-49) and during winter, PLs have a <0.5-65% chance of contacting individual ERAs (Table A.2-49).

10 Days

During the entire year (annual), the OSRA model estimates that a large spill from PLs 3, 5, 6, 8, or 9 has a <0.5-4 % chance of contacting individual LSs. Those LSs of 1% or greater include 64-66 (Point Hope-Ayugatak Lagoon), 72-85 (Point Lay - Barrow) (Table A.2-8). LAs 5, 6, 10 or 11 have a <0.5-2% chance of contacting LSs. Those LSs of 1% or greater 65 include (Cape Lisburne), 74-75 (Kasegaluk Lagoon-Icy Cape), 78-80 (Point Collie-Kugrua Bay), or 84-85 (Barrow Area) (Table A.2-8). All other LAs and PLs have a <0.5% chance of contacting individual LSs within 10 days over the entire year. The OSRA model estimates the chance of contact to ERA Land ranges from 9-10% for LAs 10 or 11 (Table A.2-2) and 1-4% for LAs 1, 4, 5, or 6. The OSRA model estimates the chance of contact to ERA Land ranges from 11-22% for PLs 3, 6, or 9 (Table A.2-2) and 3-4% for PLs 2, 5 or 8.

During summer, the OSRA model estimates a large spill, from PLs 2, 3, 5, 6, 8, or 9 has a <0.5-7% chance of contacting individual LSs 64-67 (Point Hope to Cape Sabine) and 71-85 (Sitkok Point-Barrow) (Table A.2.- 8). LAs 10 or 11 have a <0.5-4% chance of contacting LS 65 (Cape Lisburne), 71-75 (Kukpowruk River-Icy Cape), 78-80 (Point Collie-Kugrua Bay), or 83-85 (Nulavik-Barrow) (Table A.2-32). Offshore LAs 4, 5 or 6 has a <0.5-1% chance of contacting LSs 79-80 (Point Belcher-Kugrua Bay) or 84-85 (Barrow area). LA1 has a <0.5% chance of contacting individual LSs within 10 days over summer. The OSRA model estimates the chance of contact to ERA Land ranges from 14-15% for LAs 10 or 11 (Table A.2-26) and 2-5% for LAs 1, 4, 5, or 6. The OSRA model estimates the chance of contact to ERA Land ranges from 15-30% for PLs 3, 6, or 9 (Table A.2-26) and 3-8% for PLs 2, 5 or 8.

During winter, the OSRA model estimates that a large spill from PLs 3, 6, 8, or 9 have a <0.5-3% chance of contacting individual LSs 64-67 (Point Hope-Cabe Sabine) 72-76 (Point Lay-Tunalik River), or 78-85 (Point Collie-Barrow (Table A.2.56). Nearshore LAs 10, or 11, have a <0.5-1% chance of contacting LS 65 (Cape Lisburne) 79-80 (Wainwright-Kugrua Bay) or 84-85 (Barrow Area) (Table A.2-56). All other LAs and PLs have a <0.5% chance of contacting individual LSs

within 10 days over winter (Table A.2-56). The OSRA model estimates the chance of contact to ERA Land ranges from 5-6% for LAs 10 or 11 (Table A.2-50) and 1-3% for LAs 1, 4, 5, or 6. The OSRA model estimates the chance of contact to ERA Land ranges from 8-15% for PLs 3, 6, or 9 (Table A.2-50) and 2% for PLs 2, 5 or 8.

The OSRA model estimates a large spill from LAs or PLs adjacent to or on top of ERAs has the highest percent chance of contact. During the entire year (annual), LAs have a <0.5-45% chance of contacting individual ERAs (Table A.2-2) and PLs have a <0.5-61% chance of contacting individual ERAs (Table A.2-2).

During summer, LAs have a <0.5-71% chance of contacting individual ERAs (Table A.2-26) and PLs have a <0.5-≥99% chance of contacting individual ERAs (Table A.2-26).

During winter, LAs have a <0.5-67% chance of contacting individual ERAs (Table A.2 50) and PLs have a <0.5-≥76% chance of contacting individual ERAs (Table A.2-50).

30 Days

During the entire year (annual), the OSRA model estimates that a large spill from all LAs or PLs has a <0.5-3% of contacting Russian Chukchi coastline individual LSs 5-8 or 20-39 (E. Wrangel Island, Pil'gyn-Uelen, Russia) (Table A.2-9). The percent chance of contacting the GLS Russia Chukchi Coastline (GLS 175) ranges from 10-25% for LAs or PLs (Table A.2-14). Pipeline segments 3 or 6 and LAs 10 or 11 have a <0.5%-3% chance of contacting individual LSs 64-67 (Point Hope-Cape Sabine). During the entire year all LAs and PLs have a <0.5-6% chance of contacting individual LSs 71-85 (Kukpowruk River -Barrow) (Table A.2-9).

During summer, the OSRA model estimates that a large spill from all LAs and PLs has a <0.5-2% chance of contacting LSs 5-8 or 21-37 (E. Wrangel, Pil'khikay -Chegitun, Russia). All LAs and PLs have a <0.5%-10% chance of contacting at least one individual LSs 64-88 (Point-Cape Simpson) (Table A.2-33).

During winter the OSRA model estimates that a large spill from all LAs or PLs has a <0.5-3% of contacting Russian Chukchi coastline individual LSs 5-8 or 20-39 (E. Wrangel Island, Pil'gyn-Uelen, Russia) (Table A.2-57). Pipeline segments 3 or 6 and LAs 10 or 11 have a <0.5%-3% chance of contacting individual LSs 64-67 (Point Hope-Cape Sabine). All LAs and PLs have a <0.5%-4% chance of contacting at least one individual LSs 72-85 (Point Lay- Barrow) (Table A.2-57).

The OSRA model estimates a large spill from LAs or PLs adjacent to or on top of ERA have the highest percent chance of contact. During the entire year (annual), LAs have a <0.5-47% chance of contacting individual ERAs (Table A.2-3) and PLs have a <0.5-64% chance of contacting individual ERAs (Table A.2-3).

During summer, LAs have a <0.5-75% chance of contacting individual ERAs (Table A.2-27) and PLs have a <0.5-86% chance of contacting individual ERAs (Table A.2-27). During winter, LAs have a <0.5-70% chance of contacting individual ERAs (Table A.2-51) and PLs have a <0.5-≥99% chance of contacting individual ERAs (Table A.2-51).

A-4. Oil-Spill-Risk Analysis

A measure of oil-spill risk is determined by looking at the potential for one or more large spills occurring as a result of exploration, development, or production from the Scenario and then of a large spill contacting a shoreline segment, resource, or resource area of concern (called an environmental resource area (ERA)). If spilled crude or condensate oil contacts any portion of a shoreline segment or ERA, it is called simply a contact. The oil spill risk analysis helps determine the relative risk of occurrence and contact of one or more large spills in and adjacent to the Leased Area.

Combined probabilities are the chance of one or more large spills occurring and of those spills contacting over the life of the Scenario. They are estimated using the conditional probabilities, the large oil-spill rates, the resource estimates, and the assumed transportation scenarios. These are combined through matrix multiplication to estimate the mean number of one or more large spills from operations in and adjacent to the Leased Area occurring and of any of these spills making a contact.

A-4.1. Chance of One or More Large Spills Occurring

The chance of one or more large spills occurring is derived from two components: (1) the large spill rate and (2) the resource-volume estimate. The spill rate is multiplied by the resource volume to estimate the mean number of spills. Oil spills are treated statistically as a Poisson process, meaning that they occur independently of one another. If BOEM constructed a histogram of the chance of exactly 0 spills occurring during some period, the chance of exactly 1 spill, or exactly 2 spills, and so on, the histogram would have a shape known as a Poisson distribution. An important and interesting feature of this distribution is that it is entirely described by a single parameter, the mean number of large spills. Given the mean number of large spills, you can calculate the entire histogram and estimate the chance of one or more large spills occurring.

A-4.1.1. Large Spill Rates

BOEM derives the large oil-spill rates for the Arctic OCS from a fault-tree modeling study conducted by the Bercha Group Inc. (2014b). Using fault trees, oil-spill data from the Gulf of Mexico and Pacific OCS (Bercha Group Inc., 2013) were modified and incremented to represent expected Arctic performance and included both Arctic and non-Arctic variability.

Fault-tree analysis is a method for estimating the spill rate resulting from the interactions of other events. Fault trees are logical structures that describe the causal relationship between the basic system components and events resulting in system failure. Two general fault trees are constructed, one for large pipeline spills and one for large platform/well spills. In the Bercha Group Inc. (2006, 2008) studies, fault trees were used to transform historical spill statistics for non-Arctic regions to predictive spill-occurrence estimates for the Beaufort and Chukchi seas' sale areas. The Bercha Group, Inc. (2008) fault-tree analysis focused on Arctic effects as well as the variance in non-Arctic effects, such as spill size and spill frequency. Arctic effects were treated as a modification of existing spill causes as well as unique spill causes. Modification of existing spill causes included those that also occur in other OCS regions but at a different frequency, such as trawling accidents. Unique spill causes for pipeline spills included events that occur only in the Arctic, such as ice gouging, strudel scour, upheaval buckling, thaw settlement, and other causes. For platforms, unique spill causes included ice force, low temperature, and other causes. The measures of uncertainty calculated were expanded beyond Arctic effects in each fault-tree event to include the non-Arctic variability in spill size, spill frequency, and facility parameters, including wells drilled, number of platforms, number of subsea wells and subsea pipeline length. The inclusion of these types of variability—Arctic effects, non-Arctic data, and facility parameters—is intended to provide a realistic estimate of spill-occurrence indicators on the Arctic OCS and their resultant variability.

The Bercha Group Inc. (2014b) fault tree analysis includes updated spill information from the Gulf of Mexico and the Pacific OCS (Bercha Group Inc., 2013). It also included refined information about LOWC frequencies used in the fault tree by incorporating information from a recently completed LOWC study (Bercha Group Inc., 2014a). The LOWC study updated offshore LOWC frequency information through 2011 for both the Gulf of Mexico (GOM) and the Pacific (PAC) OCS and the North Sea using information from both the SINTEF worldwide database and the U.S. GOM and PAC OCS. Previous fault tree studies (2006, 2008) used all LOWC events and their resultant frequencies regardless of whether or not they spilled crude or condensate oil. To this extent, previous fault tree results were conservative. In addition, platform spills, which occurred from a LOWC event, were previously double counted as both a platform/well spill and a LOWC event.

Recent studies (Bercha Group Inc., 2014a; Ji, Johnson, and Wikel, 2014; USDOI, BOEM, 2012a) have continued to refine data and information about LOWC. Until recently, a consolidated dataset of multiple variables was not readily available to analyze the volumes of oil associated with LOWC with other applicable variables. Of the approximately 192 Gulf of Mexico LOWC events from 1980-2011, nine escalated into blowouts and spilled crude or condensate ≥ 50 bbl (Bercha Group Inc., 2014a) all of which were small spills except the DWH. The new information reveals that, compared to the total number of LOWC events, there are few crude and condensate spills as a result or a LOWC escalating into a blowout.

A-4.1.1.1. Results for OCS Large Spill Rates

For purposes of fault-tree analysis, BOEM uses the E&D Scenario in Appendix B. The annual rates were weighted either by the annual production divided by the total production or the year divided by the total years, and the prorated rates were summed to determine the large spill rates over the life of the exploration and production from the Leased Area. For the anchor A and satellite A2 prospects in the Leased Area, the life of exploration, development and crude oil and natural gas liquid condensate production is 51 years. This is inclusive of an oil production period of 44 years. Bercha Group Inc. (2014b) calculated the mean spill rate for Platforms/Wells, Pipelines, and Total as well as the 95% confidence intervals on the total large spill rate per Bbbl as shown below:

Type	Mean
Platforms/Wells	0.11 spills per Bbbl produced
Pipelines	0.21 spills per Bbbl produced
Total	0.32 spills per Bbbl produced
95% Confidence Interval	0.12 -0.56 spills per Bbbl produced

This analysis shows that the major contributors to the large spill rates are pipelines.

A-4.1.2. Resource-Volume Estimates

For this analysis it is assumed that 4.3 Bbbl is produced and transported. The resource volume estimates and resource E&D scenarios are discussed in the Second SEIS Sections 2.3, 4.1.1, and Appendix B.

A-4.1.3. Transportation Assumptions

Section 3.1.5 discusses the transportation assumptions for the hypothetical launch areas and their associated hypothetical pipelines.

A-4.1.4. Results for the Chance of One or More Large Spills Occurring

BOEM's estimate of the likelihood of one or more large spills occurring assumes that there is a 100% chance that development(s) will occur and 4.3 Bbbl of crude oil and natural gas liquid condensate will be produced. (That volume is based on estimates discussed in Chapter 2, Section 2.3 and Chapter 4, Section 4.1.1). BOEM evaluates what would happen if full development as described in the Scenario occurred, even though the chance of that happening is probably very small in a frontier area like the Chukchi Sea. If a development occurs, this oil-spill analysis more accurately represents the chance of one or more large spills occurring.

Additionally, the chance of one or more large spills occurring as a result of operations in and adjacent to the Leased Area is estimated over the life of the development(s). For the Leased Area, crude oil and natural gas liquid condensate production is assumed to occur over a production period of 44 years. In the estimates of one or more large spills occurring, the annual chances for large spills occurring from both pipeline and platforms/wells over the entire estimated life of the development(s) are added together to get the final result.

The large spill rates used in this section are all based on the mean number of large spills per Bbbl of hydrocarbon produced. Using the above mean spill rates for large spills, Table A.1-21 shows the estimated mean number of large oil spills for the Alternatives I, III or IV. BOEM estimates 0.9 pipeline spills and 0.5 platform (and well) spills would occur, for a total (over the life of the Leased Area) of 1.4 spills.

For purposes of analysis, two large spills are assumed to occur and are analyzed in this Second SEIS. The two large spills are assumed to occur during the development and production phase. This assumption is based on the fact that a very small fraction of spills are estimated during the relatively short exploration drilling phase, as compared to the total spill frequency for exploration, development and production activities.

Now, looking at the entire 51-year exploration and oil and condensate production life of the Leased Area, BOEM uses the above mean spill number to determine the Poisson distribution. Table A.1-22 shows the chance of no large pipeline spills occurring is 41%, and the chance of one or more large pipeline spills occurring is 59%. The chance of no large platform (wells and platform) spills occurring is 61% and the chance of one or more large platform (wells and platform) spills is 39%. The mean spill number total is the sum of the mean number of platform, well, and pipeline spills over the entire 51-year exploration and production life. The chance of no large spills occurring is 25%, and the chance of one or more large spills occurring is 75% for the Scenario. Figure A-1 shows the Poisson distribution that demonstrates this analysis.

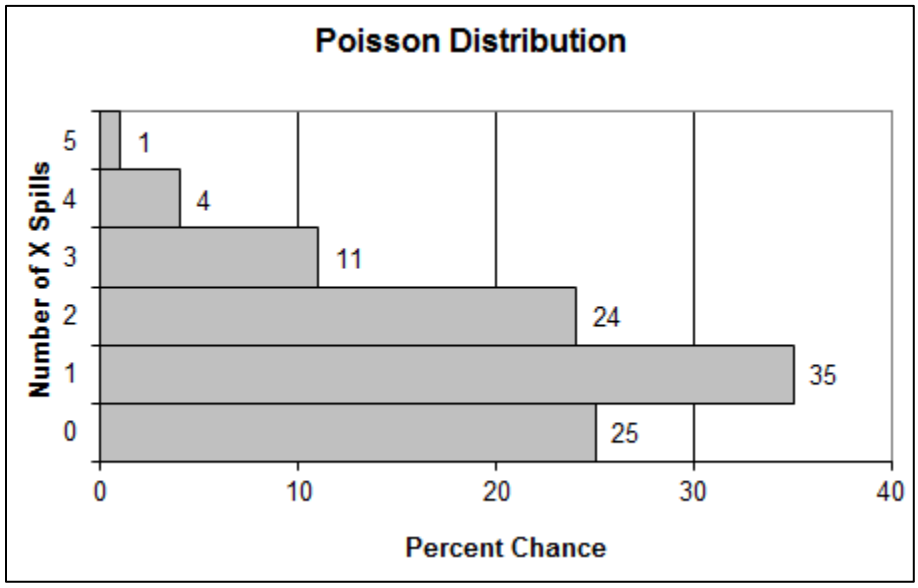

Figure A-1. Poisson Distribution: Leased Area, Alternatives I, III or IV (Pipeline and Platform/Well) over the Scenario Life.

A-4.2. Chance of a Large Spill Contacting: Conditional Probabilities

The chance of a large spill from operations on the Leased Area contacting shoreline sections or ERAs is taken from the oil-spill-trajectory model results, called conditional probabilities. These are summarized in Section 3.4.2.2 and are listed in Tables A.2-1 through A.2-72.

A-4.3. Results of the Oil-Spill-Risk Analysis: Combined Probabilities

Tables A.2-73 through A.2-75 show the annual combined probabilities for the Leased Area for Alternatives I, III or IV. The combined probabilities reflect the chance of one or more large spills occurring and contacting resources over the Scenario life of the Leased Area. Because no leases or few (5) leases were contained within the alternatives the combined probabilities varied by ±1%

between alternatives. The variation was not substantive enough to warrant a separate analysis and is well within the variation on the input ice, ocean and wind fields.

For the most part, the chance of one or more large spills from operations in or adjacent to the Leased Area occurring and contacting land segments or environmental resource areas is 37% or less within 30 days, or 40% or less within 360 days. For environmental resource areas with a chance of occurrence and contact ≥ 1%, the chance of one or more large spills from operations in or adjacent to the Leased Area occurring and contacting a certain environmental resource area ranges from 1-21%, 1-27 %, and 1-37 % within 3, 10, and 30 days, respectively. Land segments with at least a 1% chance of one or more large spills from operations on the Leased Area occurring and contacting land segments within 30 days include LSs 7,8 (Wrangel Island) 22-37 (Chukotka coastline), 64-80 (Point Hope – Eluksingiak Point) and 84-85 (Barrow Area). The LSs 30 (Nutepynmin), 31 (Alyatki), 80 (Eluksingiak Point), and 84 (Will Rogers and Wiley Post Mem.) have a 2% and 79 (Wainwright) and 85 (Barrow) have a 3% chance of one more large spills occurring and contacting.

A-5. Accidental Small Oil Spills

Small spills are spills that are <1,000 bbl. Table A.1-1 shows the Second SEIS sections where BOEM analyzes the effects of small spill(s). BOEM considers three oil types for small spills: crude, condensate and refined oil.

Small spills, although accidental, are relatively routine. These are dealt with using routine spill prevention and response measures. Small spills would occur from both exploration and development activities. The majority of small spills could be contained on a vessel or platform, and refined fuel spills that reach the water would evaporate and disperse within hours to a few days. Further, those spills reaching the water may be contained by booms or absorbent pads. BOEM estimates small spills are likely to occur over the life of the exploration and development activities.

A-5.1. Exploration

Exploration includes both geological and geophysical activities (marine seismic, geotechnical and geological surveys) and exploration and delineation drilling activities. Small spills during exploration are likely to be refined oil products such as lube oil, hydraulic oil, gasoline or diesel fuel.

A-5.1.1. Geological and Geophysical (G&G) Activities

Small fuel spills associated with the vessels used for G&G activities could occur, especially during offshore vessel-to-vessel fuel transfers. For purposes of the oil spill analyses for Alternatives I, III or IV, no large or very large crude or diesel oil spills are estimated from G&G activities, although small spills are expected to occur. This is based on a review of potential discharges and on the historical oil spill occurrence data for the Alaska OCS and adjacent State of Alaska waters. Several spills from refueling operations (primarily at West Dock) have been reported to the National Response Center in the Beaufort and Chukchi seas and all the spills were small.

For purposes of analysis, BOEM estimates an offshore vessel transfer spill ranges from <1-13 bbl (USDOI, BOEMRE, 2010a; USDOI, BOEMRE, 2010b; USDOI, BOEM, 2012b; USDOI, BOEM, 2013). The <1 bbl is the estimated volume of diesel fuel resulting from an offshore vessel fuel transfer accident assuming the dry quick disconnect and positive pressure hoses function properly. Dry quick disconnect couplings are designed to snap closed should the valve become disconnected with the poppet open, thereby limiting liquid release. Positive pressure fuel hoses are designed to stop pumping if the pressure is lost in the hose due to a break.

In a potential scenario, where a transfer hose ruptures and the positive pressure hoses fail, BOEM assumed that it would take a maximum of 30 seconds for someone to discover the rupture and 30

seconds to stop the pump. The estimated volume spilled during the maximum 60 second interval is likely to be approximately 13 bbl. In this scenario, BOEM assumes that all spilled fuel reached the water and none remains on the deck of the vessel.

In this analysis, BOEM assumes that 99% of the time, all dry quick disconnect and positive pressure hoses function properly. BOEM also assumes that every other G&G activity has an offshore transfer fuel spill (which is a very conservative estimate, based on the fact that no offshore fuel transfer spills have been reported from G&G surveys in the Alaska Region). Also, BOEM assumes that spills do not occur in the same space and time, and that up to one G&G activity has an equipment malfunction. Therefore, fuel spills from a maximum level of anticipated annual G&G activities could range from 0 to less than 3 at a minimum and up to 13 bbl at a maximum of fuel spilled in one instance annually. Table A.1-23 shows the estimated number and volume of small spills during G&G activities.

A-5.1.2. Exploration and Delineation Drilling Activities

For purposes of the oil spill analyses for Alternatives I, III or IV, no large crude or diesel oil spills are estimated from exploration and delineation drilling activities. This is based on a review of potential discharges, historical oil spill and modeling data, and the likelihood of oil spill occurrence. This estimate is based on:

- The low rate of OCS exploratory drilling well-control incidents spilling crude oil per well drilled
- The fact that, since 1971, one OCS crude oil spill (large/very large) has occurred during temporary abandonment (converting an exploration well to a development well) while more than 15,000 exploratory wells were also drilled
- The low number (40) of exploration wells being drilled as a result of this proposed action
- The fact that no crude oil would be produced from the exploration wells, and the wells would be permanently plugged and abandoned
- The history of exploration spills on the Arctic OCS, all of which have been small
- The fact that no large spills occurred while drilling 35 exploration wells to depth in the Arctic OCS 1975-2003
- Pollution prevention and oil spill response regulations and methods, implemented by BOEM, BSEE, and the operators and since the Deepwater Horizon spill have reduced the risk of spills and diminished their potential severity (USDOI, BOEM, 2011; Shell, 2011, Shell, 2012)

Historical Beaufort Sea and Chukchi Sea OCS exploration spill data suggest that the most likely cause of an oil spill during exploration would be operational, such as a hose rupture, and the spill could be relatively small (Table A.1-2). For purposes of analysis, up to a 50-bbl diesel fuel-transfer spill was chosen as one spill volume in the small spill category and 5-bbl was selected as the typical volume. This was based on historical exploration spill sizes in the Beaufort and Chukchi OCS, OCS oil-spill data, which indicated that 99.7% of all OCS spills are <50 bbl (Anderson, Mayes, and LaBelle, 2012) and estimates of USCG Worst Case Discharge, average most probable discharge and maximum most probable discharge for exploration plans (Shell, 2011, Shell, 2012).

The WCD (for the purposes of the USCG) was calculated based on the definition contained in 33 CFR 154.1029(b) (2). Operators used the following values: (1) Maximum Time to Discover Release: 5 minutes; (2) Maximum Time to Shutdown Pumping: 0.5 minutes (30 seconds) (3) Maximum Transfer Rate: 320 gpm (based on representative fuel transfer pumps on the oil spill response vessel = 7.6 bbl/min; (4) Total Line Drainage Volume: 163 gal [assuming a 4-inch by 820-ft marine hose between the pump manifold on the fuel barge and the delivery flange on the inlet piping at the

drillship] or 3.9 bbl. The total volume was 48 bbls and for this analysis was rounded to the nearest ten for a value of 50 bbl.

The maximum most probable discharge is 5.0 bbl of diesel fuel. It was calculated from the definition contained in 33 CFR 154.1020 (the lesser of 1,200 bbl or 10% of the volume of the WCD).

Small spills could occur during exploration and delineation drilling activities. In this analysis BOEM assumes that every drilling activity has an offshore transfer fuel spill. Annually one drilling activity has a WCD and one has a maximum most probable discharge for a total of 55 bbl annually. These spills do not occur in the same space and time. The volumes range from 5 up to 50 bbl of fuel spilled. The estimated number and volume of small spills during exploration activities presented is displayed in Table A.1-23.

The 50 bbl spill is estimated to last less than 3 days on the surface of the water, based on the SINTEF OWM calculations. In terms of timing, a small spill from the exploration activities could happen at any time from July to November. Conservatively, BOEM assumes that the vessel would not retain any of the diesel fuel, and depending on the time of year, a small spill could reach the vessel and then the environment. The environment could be open water or open water and ice. The analysis of a small spill examines the weathering of the estimated 50 bbl diesel fuel spill.

BOEM summarizes below the estimates for the fate and behavior of diesel fuel in the analysis of the effects of oil on environmental, economic and social resources in Section 4.3. BOEM outlines the scenario assumptions for an exploration drilling small spill to provide a consistent analysis of small oil spill impacts by resource:

- One small spill occurs
- The spill size is 50 or 5 bbl
- The oil type is diesel fuel
- All the oil reaches the environment; the vessel or facility absorbs no oil
- There is no reduction in volume due to cleanup or containment. (Pollution prevention, containment and cleanup are analyzed separately as mitigation and as disturbance.)
- The spill could occur at any time of the exploration operations (July-November)
- The weathering for a 50 bbl spill is as shown in Table A.1-24, and the spill lasts less than 3 days on the water
- The spill starts within the Leased Area or Kotzebue Sound

A-5.1.3. Modeling Simulations of Oil Weathering

To judge the effect of a small oil spill, BOEM makes estimates regarding how much oil evaporates, how much oil is dispersed, and how much oil remains after a certain time period. BOEM derives the weathering estimates of diesel fuel oil from the SINTEF Oil Weathering Model Version 4.0 (Reed et al., 2005) modeling results for up to 30 days. Table A.1-24 summarizes the results BOEM estimates for the fate and behavior of a 50-bbl diesel fuel spill. Based on OWM modeling simulations and historical response experience, a small, 50-bbl diesel fuel oil spill will be localized and short term.

A-5.2. Development and Production

The analysis of onshore ANS crude oil spills greater than 1 barrel is performed collectively for all facilities, pipelines, and flowlines (Nuka, 2013; Robertson et al., 2013). ANS crude oil spill frequencies are applied to estimate small spills for the Leased Area. Following is the estimated number and volume of small crude and refined oil spills during development and production:

For purposes of analysis, this Second SEIS assumes a median small crude or condensate spill size of 3 bbl (Robertson et al., 2013a, Anderson, Mayes and LaBelle, 2012). An estimated 220 small crude oil spills, >1 bbl, could occur during the 44-year oil-production period for Alternatives I, III or IV; an average of about 5 spills per year. An estimated 260 refined-oil spills >1 bbl could occur during the 44-year oil-production period, an average of about 6 spills per year. The same number of refined spills occurs over the 44-year gas-sales production period. Overall, an estimated 11 crude and refined oil spills >1 and <1,000 bbl are assumed to occur each year of production for Alternatives I, III or IV for years 10-30, 17 for years 31-53 and 6 for years 54 to 78.

In addition to the spills just discussed, an estimated two small crude oil spills ≥500 bbl could occur during the 44-year oil-production period for Alternatives I, III or IV. One of those two small crude oil spills ≥500 bbl is assumed to occur from the 300 mile onshore pipeline.

A-5.3. Small Spill Assumptions Summary

The analysis of small oil spill effects for Alternatives I, III or IV is based on the following assumptions:

- Small spills occur during exploration and delineation activities and initial development activities.
- Spills from offshore refueling during geological and geophysical activities ranges up to <3 bbl annually with one individual spill of approximately 13 bbl.
- Small spills during exploration and delineation drilling operations range from 0 up to 50 bbl.
- All the oil reaches the environment.
- The oil types could be diesel during exploration and delineation activities and crude, diesel, or condensate during production.
- The small spill could occur during open water during exploration and delineation activities and at any time of the year during development and production.
- The spill weathering is shown in Tables A.1-24 or 25.

A-6. Potential for Natural Gas Releases

Potential accidental gas release impact producing factors were detailed in Lease 193 SEIS Section IV.B.5 for gas sales totaling 2.25 trillion cubic feet (Tcf) over 20 years. This analysis evaluates the potential for a large gas release during natural gas development and production of 2.2 Tcf over 44 years, as well as the potential impacts of such releases on the environment. This analysis identifies potential releases from:

- LOWC escalating into a blowout at production platforms/wells
- Ruptured or leaking pipelines
- Onshore facilities

The following subsections discuss possible ways in which natural gas may be released into the environment, assign frequencies to notable events, and present hypothetical release scenarios for further environmental resource-specific analysis.

Loss of Well Control

It is possible, though unlikely that a LOWC during natural gas production could cause a release of natural gas into the environment. A LOWC can result in a blowout, but blowouts do not always follow a LOWC incident. Also, the frequency of LOWCs can vary with the type of well drilled. The

International Association of Oil and Gas Producers estimates the frequency of LOWC events at 3.6 x 10^{-4} gas blowouts per exploration well, and at 7.0 x 10^{-4} gas blowouts per development well drilled (IAOGP 2010). The production well-control blowout incident rate for production of gas is an order of magnitude lower, estimated at 5.7 x 10^{-5} blowouts per well year (IAOGP, 2010). While estimates for gas blowout frequencies have been updated the since the Lease Sale 193 SEIS, they still occur at a very low frequency.

Initially, natural gas produced from the Leased Area will be reinjected due to the lack of natural gas infrastructure. In about 2031, infrastructure will have been installed, and sale of natural gas from the Lease Area is expected to begin. When this occurs, it is assumed that one well control incident of a single well on the facility could occur, releasing 10 million cubic feet of natural gas for one day. This is based on the average well production for one day from one well and the estimated rates of blowout duration for gas production wells.

Ruptured Pipeline

Although unlikely, there exists some potential for a gas pipeline to rupture. The estimated rate of offshore gas pipeline ruptures in the Gulf of Mexico is 2.4 x 10^{-5} per mile-year (USDOI, MMS, 2009). For a 160 mile offshore gas transmission pipeline, over a 44 year production life, the estimated number of incidents is 0.17 offshore gas pipeline ruptures over the life of the gas sales. For onshore gas pipelines, the estimated spill rate for a generic DOT onshore gas transmission lines from 1994-2013 is 1.5 x 10^{-4} spill or release per pipeline mile per year (USDOT, 2013a, b). For a 300 mile onshore pipeline, over a 44 year production life, the estimated number of significant incidents using DOT's estimated rate is 2 pipeline ruptures over the life of the gas sales. Under DOT regulation, significant incidents are incidents that involve property damage of more than $50,000, injury, death, release of gas, or that are otherwise considered significant by the operator. The lack of population and scarcity of human activity on the ANS is expected to reduce the historical frequency of significant incidents as defined by DOT.

If a major release of dry natural gas would occur, this would cause a sudden decrease in gas pressure, which in turn would automatically initiate procedures to close the valves on both ends of the ruptured segment of pipeline. Closure of the valves would effectively isolate the rupture and limit the amount of natural gas released into the environment. Given the daily flow rate and the estimated total number of valves, it is estimated that approximately 20 million cubic feet could be released within one pipe section between two valves. Onshore any gas releases from an elevated pipeline would disperse into the atmosphere. There is some small potential for ignition, but in the remote Alaska North Slope, ignition sources would not be readily available.

Onshore Facility

Although unlikely, there remains some potential for a gas leak and explosion at the onshore facility, due to the enclosed space in the facility.

Gas Release Fate

Natural gas is primarily made of up methane CH_4 and ethane C_2H_6 which make up 85-90% of the volume of the mixture. Propane, butane, and heavier hydrocarbons can be extracted from the gas system and liquefied for transportation and storage. These natural gas products are commonly known as liquid petroleum gas or LPG. Pentane through decane are the intermediate-weight hydrocarbons and are volatile liquids at atmospheric temperature and pressure. The common names for these natural gas products are pentanes-plus, condensate, natural gasoline, and natural gas liquids (NGLs). Produced gas is expected to be dry gas (no water or condensates).

In the event of a pipeline rupture, the leak detection system would close the pipeline isolation valves. Any release would be almost entirely vapor, rather than liquid. Winter temperatures could cause the

butane and pentane components to initially remain in a liquid state. However, if any liquids formed, much of the volume would quickly evaporate due to the volatile nature of NGLs. The consequences of an accidental spill of NGLs as a result of a pipeline rupture could include fire and/or explosion of NGL vapors.

The primary component of natural gas is methane, a colorless, odorless, and tasteless gas. It is not toxic in the atmosphere, but is classified as a simple asphyxiate, possessing an inhalation hazard. As with all gases, if inhaled in high enough concentration, oxygen deficiency could occur and result in suffocation. The specific gravity of methane is 0.55 (Air = 1.0). Being lighter than ambient air, it has the tendency to rise and dissipate into the atmosphere, rather than settle into low areas. For this reason, natural gas leaks are assumed to rise and disperse.

A-7. Very Large Oil Spills

A-7.1. Estimates of Source and Size

Very large spills could potentially come from four sources associated with OCS exploration or development operations: (1) pipelines (2) facilities (3) tankers or (4) support vessels. BOEM reviewed those four sources and determined well-control incidents (LOWCs) have the potential for the largest spill volumes, assuming all primary and secondary safeguards fail and the well does not bridge (collapse in on itself). At this time, pipelines are the preferred mode of petroleum transport (over tankers) in the Chukchi OCS and, therefore, BOEM did not consider the loss of a fully loaded tanker. The loss of the entire volume in an offshore pipeline would be less than a long duration well control incident with high flow rates. Sizes of spills from support vessels were considered based on foundering and the loss of entire fuel tanks, and determined to be lower in volume than a well control incident where all primary and secondary safeguards failed. For purposes of analysis, BOEM examined a well control incident which escalates into a catastrophic blowout. This Second SEIS details the oil spill analysis results that are relevant to the very large oil spill (VLOS) analysis.

A-7.2. Behavior and Fate of Crude Oils

The Lease Sale 193 FEIS Appendix A.1, Section B, and this Appendix, Section A-2.1 summarizes the behavior and fate of crude oil. This section summarizes and updates relevant information to the VLOS analysis.

A-7.2.1. Release from a Well Control Incident

A very large oil and gas release could rise to the ocean surface from shallow to moderate depths on the seafloor (e.g. 1979 Ixtoc I spill) or fall from the top of the rig or platform to the surface of the ocean. The force of the gas would facilitate the formation of small oil droplets (0.5 – 2.0 mm) and to disperse them in the ocean or atmosphere (Dickins and Buist, 1981; Belore, McHale and Chapple, 1998; S.L. Ross Environmental Research Ltd, D.F. Dickins and Associates Ltd., and Vaudrey and Associates Inc., 1998). A small portion (1-3%) of droplets could form a plume as identified from Ixtoc at shallow to moderate depths without the injection of dispersants (Boehm and Fiest, 1982). The more soluble compounds within the oil may dissolve, particularly from small droplets that are prevalent in the vertical plume, which is where the vigorous turbulence occurs (Adcroft et al. 2010). Figure A-2 diagrams a subsea blowout in shallow to moderate water depths (Westergaard, 1980). A subsea release in shallow to moderate depths moves through three zones: (1) a jet zone causing turbulence and droplet formation, (2) a buoyancy zone where gas, oil, and water are carried to the surface and droplet size governs rise velocity, and (3) a surface interaction zone where the surface influence carries the oil with the prevailing currents or ice and the gas exits into the atmosphere, which causes a surface boil zone (Westergaard, 1980; PCCI, 1999; Reed et al., 2006). Volatile organic carbons would be measurable in the atmosphere downwind of the spill in a small area

confined to a narrow plume (deGouw et al., 2011; Ryerson et al., 2011) during the summer open water and broken ice seasons.

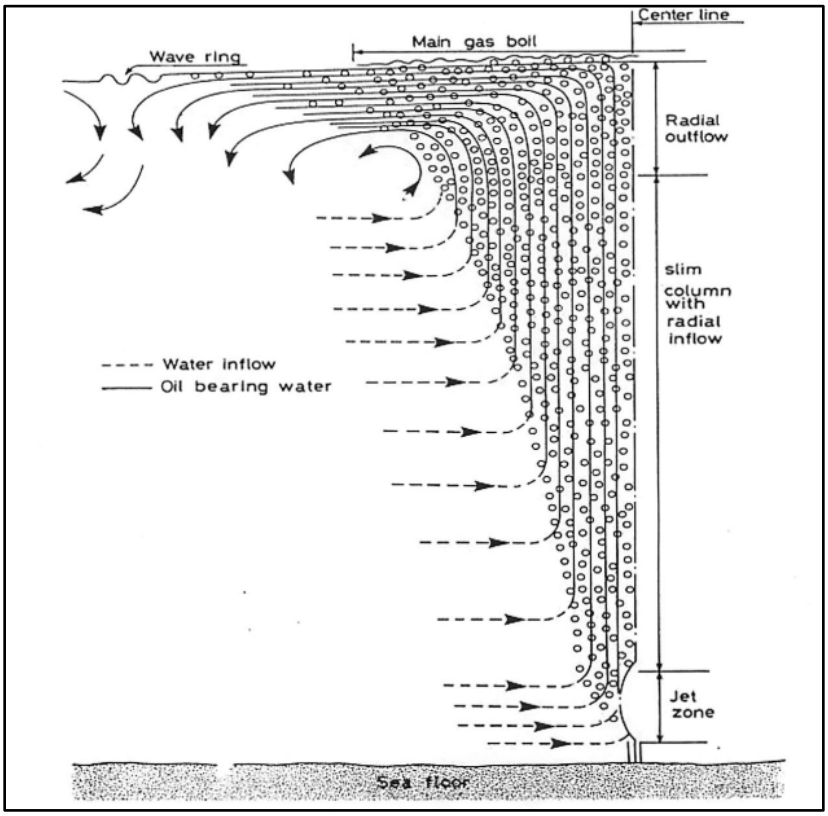

Figure A-2. Shallow (<50 meters) Underwater Blowout Plume.

Source: Westergaard, 1980.

For well control incidents at shallow to moderate depths, the gas is considered to be an ideal gas with a specific volume decreasing linearly with pressure. Dissolution of gas from rising bubbles may be minimal for incidents at shallow to moderate depth since the residence time of gas bubbles is expected to be short (Reed et al., 2006). Thus, very little of the gas would dissolve in the water column and nearly all of the gas would be released to the atmosphere.

A-7.2.2. Ice Present

The fate and behavior of oils in ice conditions is different from oil in temperate water; slower chemical and biological reactions occur when temperatures are lower. Broken ice occurs in the Chukchi Sea during fall freezeup and spring breakup. The ice would restrict the oil somewhat and reduce spreading (Gjosteen and Loset, 2004; Faksness et al., 2011). Weathering of oil in high-ice concentrations (70-90%) is significantly slower compared to weathering in open water (Brandvik et al. 2010). However, unless the oil is frozen into the ice, evaporation would continue to occur. Dispersion and emulsification rates are lower in broken ice than in open water. During fall freezeup, the oil would freeze into the grease ice and slush before ice sheeting occurs (NORCOR, 1975). Winds and storms could break up and disperse the ice and oil until the next freezing cycle occurs. These freezing cycles could be hours or days.

Faksness and Brandvik (2008a) studied the dissolved water-soluble crude oil components encapsulated in first-year sea ice. Their data show a concentration gradient from the surface of the ice to the bottom, indicating there is transport of the dissolved components up through brine channels. Field studies also showed that high air temperature leads to more porous ice, and the dissolved water-

soluble components leak out of the ice rapidly; however, under cold air temperatures and less porous ice, the water-soluble components leak out of the ice more slowly and have potentially toxic concentrations (Faksness and Brandvik, 2008b).

Any oil remaining in the environment during deep winter, the oil would freeze into the forming and existing ice sheets (Dickens, 2011; Mar, Inc., et al., 2011). Then, in late spring and summer, the unweathered oil would melt out of the ice at different rates, depending on whether it is encapsulated in multiyear or first-year ice, and depending on when the oil was frozen into the ice. In first-year ice, most (85%) of the oil spilled at any one time would percolate up to the ice surface over about a 10-day period (Dickens, Buist and Pistruzak, 1981; Dickins et al., 2008; NORCOR, 1975; Nelson and Allen, 1981). In approximately mid-July, the oil pools would drain into the water among the floes of the opening ice pack. Thus, in first-year ice, oil would be pooled on the ice surface for up to 30 days before being discharged from the ice surface to the water surface. The pools on the ice surface would concentrate the oil, but only to about 2 centimeters thick, allowing evaporation of 5% of the oil, the part of the oil composed of the lighter, more toxic components. By the time the oil is released from the melt pools on the ice surface, evaporation will have almost stopped, with only an additional 4% of the spilled oil evaporating during an additional 30 days on the water.

A-7.2.3. Open Water

Spilled oil on sea water would move with the currents, ice, and winds. In addition to sunlight breaking down the oil, sunlight also has the potential to cause photo-enhanced toxicity (Barron et al., 2008).

A-7.2.4. Persistence

Spilled oil in sediments weathers differently than spilled oil in the open ocean. Shoreline oiling and persistence depends on a number of factors (Etkin, McCay, and Michel, 2007). Certain factors allow for some spills to persist in the shoreline and adjacent intertidal areas for decades (Li and Boufadel, 2010; Owens, Taylor, and Humphrey, 2008; Peacock et al., 2005). Many coastlines of the Chukchi and Beaufort Seas have high environmental sensitivity index (ESI) shoreline types such as tundra, marshes, peat, and fine-grained sediments to which oil clings. In these environments, oil tends to weather very slowly. The losses of hydrocarbons from both abiotic and biotic weathering in subsea Arctic sediments could be slow (Atlas, Horowitz, and Dushoshi, 1978; Payne, Clayton, and Kirstein, 2003). Table A.1-3 shows the percent high-ESI shores of the adjacent coastlines. Besides oiling the shore, some components of spilled oil can deposit on the sea floor. Dispersion of oil droplets and suspension of sediments from turbulence at the discharge location could facilitate the formation of oiled sediments and oily particulate matter, which could be deposited on the seafloor in the vicinity of the discharge location (Lee and Page, 1997; Payne, Clayton and Kirstein, 2003; Sterling et al., 2004; Farwell et al., 2009).

Spilled oil can also enter tidal waters and sediments. Lee and Page (1997) reviewed several large spills and estimated 1–13% of the spilled oil entered subtidal zones with an order of magnitude less hydrocarbon concentration than found in intertidal sediments. Exceptions (for less hydrocarbon concentrations) were semi-enclosed areas with clay-silt surface sediments and high concentrations of suspended sediments (Page et al., 1989). Oil persistence in subtidal areas would be weeks to years, except for specific areas described above (Lee and Page, 1997). Biodegradation and weathering of intertidal areas in cold waters were on the order of months to decades (Atlas, Boehm, and Calder, 1981; Prince et al., 2003). A recent study of biodegradation in the Arctic showed that as temperature increased in the Arctic summer, biodegradation increased (Chang, Whyte, and Ghoshal, 2011).

A-7.3. Very Large Oil-Spill Weathering

The weathering for a very large oil spill is as follows:

- The crude oil properties will be similar to a light crude oil of 35 API
- The size of the crude oil spill ranges from 60,000–20,000 bbl per day
- The wind, wave, and temperature conditions are as described
- The spill is a subsurface spill at approximately 40 m (meters)
- Meltout spills occur into 50% ice cover
- The properties predicted by the model are those of the thick part of the slick
- The spill occurs as a long- duration spill estimated at a daily rate
- The fate and behavior are as modeled (See Tables A.1-26 and A.1-27)
- The oil spill persists for up to 30 days in open water and ice when the wind speed is under 4 m/s (meters/second)
- The wind speed remains 4 m/s or less

For purposes of analysis, we look at the mass balance of the VLOS; in other words, how much is evaporated, dispersed, and remaining. At the average wind speeds over the Leased Area, dispersion is estimated to be moderate, ranging from 2-33% (Tables A.1-26 and A.1-27). Approximately one third of the spill evaporates within 30 days, with most of the evaporation taking place within the first day during both summer and winter.

However, at higher wind speeds (e.g., 10-15 m/s wind speed) and during summer, the slick would be dispersed and evaporated from the sea surface within a few days. Natural dispersion would take place if there was sufficient energy on the sea surface, such as breaking waves. The waves would break the oil slick into small droplets, typically with a diameter of 1–1000 μm (micrometers), which are mixed into the water masses (Reed et al., 2005). The largest droplets will resurface causing a thin monomolecular layer or sheen behind the main body of the oil spill. "Remaining" (in Tables A.1-26 and A.1-27) refers to the oil remaining after subtracting the above estimates from the total estimated release. Possible fates of the remaining oil include: remaining in the water column, settling to the sea floor, mixing with sediment, ingestion by microbes, or beaching on the shoreline with subsequent removal during shore cleanup activities or burial within the beach profile.

A-7.4. Persistence

Table A.1-3 shows the new ESI information for the coastlines of the U.S. portions of the Beaufort and Chukchi seas. The new information leads to the same conclusions discussed in the 2011 SEIS. Many coastlines of the Chukchi and Beaufort seas have high ESI shoreline types which means oil could weather very slowly and persist for long periods of time in those areas

A-7.5. Very Large Oil Spill Conditional Probabilities

Assuming a hypothetical high-volume and long-duration oil release occurs resulting in a VLOS, this section describes how the conditional probabilities from this Second SEIS for a large oil spill should be considered and applied for a VLOS, and where an offshore VLOS may go over longer time periods within 60 and within 360 days.

In this Second SEIS, a large spill is modeled differently than a VLOS. A large spill would be represented by a single trajectory, while a VLOS of long duration would be represented by numerous trajectories, as described below.

In a large spill trajectory analysis, it is not estimated that any one trajectory brings oil to a particular location. Rather, the number of trajectories contacting an individual resource over the total number of trajectories launched is used to calculate the percent chance of a hypothetical large spill trajectory contacting that resource. For example, if 1,000 large oil spill trajectories are launched and 500 of the trajectories contact that location, there is a 50% chance of a large spill contacting that location.

A long duration VLOS would consist of a spill occurring continuously for up to 74 days[1] and therefore this type of spill is more like a batch spill launched every day or so. In this case, there would be multiple trajectories over time with each trajectory launched regularly as the well continued to flow. Each trajectory would model how some fraction of the oil spill could spread to a specific resource or location. The multiple trajectories representing a VLOS would change how the conditional probabilities are interpreted. The conditional probabilities would represent how many trajectories come to that location, as described as percent trajectories (number of trajectories contacting a location/total number of trajectories launched). For example, if 1,000 trajectories are launched and 500 of the trajectories contact a specific location, then 50% of the trajectories would allow oil to be carried to that location. The terminology used hereafter is "percentage of trajectories contacting."

Therefore the conditional probabilities are used to provide information about both the large and very large spill; however the interpretation of the data changes as discussed above. Appendix A, Tables A.2-28, 30, 34, 36, 40, 42, 54, 60 and 66, which show summer and winter seasons within 60 and 360 days, are applicable to the VLOS conditional analysis.

A-7.6. Cumulative Discontinuous Area Contacted by a Very Large Oil Spill

To provide a representation of the potential cumulative area contacted by a VLOS over time and space, BOEM created a grid system of cells, each cell defined as 0.1 degree latitude by 0.33333 degree longitude. As the oil spill trajectories were computed by the model, contact with the grid cells was tabulated. For each trajectory, the cumulative area of all grid cells contacted was then calculated for the given time period.

The cumulative area is discontinuous because it does not represent the entire area contacted by the VLOS at any one time; rather, it is a cumulative estimate of the area contacted by a VLOS over six time periods (3, 10, 30, 60, 180, or 360 days) by 3,240 trajectories from each launch area. Tables B-5 and B-6 show the results for summer and winter seasons, respectively. The discontinuous cumulative area rises rapidly between 3 and 30 days, and then more slowly between 30 and 360 days. For the discontinuous area contacted after 30 days, this means the particle—a point along the oil spill trajectory—persisted (did not disperse) more than 30 days on the surface of the water and was concentrated in the ice until the ice melted out.

A-8. Historical Alaska North Slope Crude Oil Spills and Rates (≥ 500 bbl)

The ANS oil spill analysis (≥ 500 bbl) includes onshore oil and gas exploration and development spills from the Point Thompson Unit, Badami Unit, Kuparuk River Unit, Milne Point Unit, Prudhoe Bay West Operating Area, Prudhoe Bay East Operating Area, Colville River, Bear Tooth, Greater Mooses Tooth and offshore Duck Island Unit (Endicott), Oooguruk, Nakaitchuq and Northstar Unit. ANS spill data include large spills from onshore pipelines and offshore state waters and onshore production and gathering facilities. The following information does not include spills on the ANS from the TAPS, which were evaluated separately.

For the ANS, all available information on historic industry oil spills ≥ 100 bbl during the period 1968 through 2013 was obtained from industry and regulatory agencies and collated (Hart Crowser, Inc. 2000; Robertson et al. 2013).

[1] See Second SEIS Section 4.5.1 for the discussion explaining why the 74 days spill duration was selected for the VLOS analysis.

A review of the reliability and completeness of the data for spills ≥ 500 bbl (Hart Crowser, Inc. 2000; Robertson et al., 2013) indicated that the available information was most reliable starting in1985 for crude oil spills on the ANS, based on written documentation or lack of documentation for spills before that period. BOEM determined that spills ≥ 100 bbl were documented and included in the database since 1985. In 1985, the State of Alaska Department of Environmental Conservation (ADEC) began tracking spills in an electronic format. Although Hart Crowser, Inc. (2000) states that the database is complete for the years since production began, BOEM prefers to use 1985 as the starting point of reliability for large spills.

Analysis of the spill databases indicates that there are fewer spill records per year in the early years of ANS production (Everest Consulting Associates, 2007; Robertson et al., 2013). The average number of spills reported from 1977 to 1984 was 100 per year. The average number of spills reported from 1985 to 2006 was 324 spills per year—greater by a factor of three. Any uncertainty in documenting spills before that time is a concern because it is typical for spills to occur more frequently during field and pipeline startup.

A-8.1. Historical Alaska North Slope Crude Oil Spills (≥ 500 bbl)

Eight crude oil spills ≥ 500 bbl associated with onshore and nearshore ANS oil production occurred from 1985 to 2013 (Table A.1-28). One spill ≥ 1,000 bbl was documented during this time period. Of the eight spills, three are classified as a pipeline spill. Four are classified as production processing and one as a production well site. These five spills collectively are called facility spills.

Using the highest reported spill-quantity values, from 1985 to 2013, the median spill size for facilities and pipeline ≥ 500 bbl on the ANS was 663 bbl, and the mean (or average) was 1,229 bbl. For purposes of analysis, BOEM rounds the median spill size to 700 bbl. The largest facility spill on record is 925 bbl. The largest pipeline spill is 5,053 bbl. Rounded to the nearest 100 bbl (to reflect the uncertainty associated with spill estimates), the hypothetical spill sizes used for purposes of this analysis is the median spill size of 700 bbl for the both the facility and pipeline spills.

A-8.2. Historical Trans-Alaska Pipeline Crude Oil Spills (≥ 500 bbl)

Private industry provides oil-spill information to the ADEC according to the State of Alaska Regulations 18 AAC 75 and the U.S. Department of Transportation according to 49 CFR 195.50 (Reporting Accidents). The Trans-Alaska Pipeline spill data were compiled by Hart Crowser, Inc. (2000) Maxim and Niebo (2002) and NRC (2003b). The oil-spill data were collated and evaluated for completeness and comprehensiveness. The ADEC, USDOT and Alyeska online spill data reports were used to update the Trans-Alaska Pipeline crude large oil spill data to 2013.

The Trans-Alaska Pipeline spill data include the pipeline from the ANS to the Valdez marine terminal. It does not include oil spills at the marine terminal. The Trans-Alaska Pipeline oil-spill analysis includes the pipeline and the pump stations, but excludes the Valdez marine terminal. Nine crude oil spills ≥ 500 bbl associated with TAPS occurred from 1977 through 2013 (Table A.1-29). Most large crude oil spills were associated with the start-up of the pipeline. No large spills ≥ 1,000 bbl occurred from 1981 to October 2001; a period of 20 years. The mean (average) size crude oil spill ≥ 500 bbl from 1977 to 2013 is 5,142 bbl, and the median is 4,000 bbl. For spill analysis, the median spill quantity is used and rounded to the nearest 100. Therefore, the median hypothetical TAPS pipeline spill size is 4,000 bbl for the cumulative oil spill analysis.

A-8.3. Historical Alaska North Slope and Trans Alaska Pipeline Large Crude Oil Spill Rates

To use historical ANS industry spill records to successfully estimate the mean number of large oil spills occurring, there must be a properly developed and validated database. Ideally, the database should include a wide range of spill volumes over a long period of time from oil exploration and

production resembling the prospective project. The record of ANS onshore and state waters large crude oil spills from 1985-2013 represents a long time period and the record of large spills have been validated through several past and ongoing studies (Hart Crowser 2000; Maxim and Niebo 2002; NRC, 2003b; Everest Consulting, 2006; Nuka, 2010; Nuka, 2013; Robertson et al., 2013).

In addition to a properly developed and validated database, the computation of an oil-spill rate requires an exposure variable. The purpose of an exposure variable is to balance equally different oil developments that should have similar oil-spill frequencies for a given size of spills. Such an exposure variable is required, because oil developments rarely exactly resemble one other. Two basic criteria for the selection of an exposure variable are: (1) it should be defined simply; and (2) it should be a quantity readily estimated. The verification of a potential exposure variable includes a demonstration that the exposure variable generates equal values, in a statistical sense, for oil developments with similar oil-spill histories.

For oil spills, numerous such variables are in use, including historic volumes of oil produced/transported, number of wells drilled, well-years, and pipeline mile-years. Each of these exposure variables has an assigned application; for example, "wells drilled" would be used to compute the chance of a loss of well control incident during drilling operations. Moreover, two different variables may be used for computing the spill rate from the same segment of an oil development; for example, both historic volumes of oil produced/transported, and pipeline mile-years are used to estimate the spill rate from the same pipeline. For this analysis the exposure variable of volume of oil produced and pipeline mile year were calculated. For purposes of analysis, the volume of oil produced was used to estimate the large spill rate as shown below.

Alaska North Slope Production

1977-2013 16.7 Bbbl

1985-2013 12.8 Bbbl

Trans-Alaska Pipeline Mileage

1977-2013 29,238 pipeline mile years

1985-2013 23,209 pipeline mile years

A-8.3.1. Alaska North Slope Large Crude Oil Spill Rate 1985-2013 Based on Volume

Since 1985, one ANS facility or pipeline spill ≥ 1,000 bbl from ANS production has occurred. No documentation for crude oil spills ≥ 100 bbl occurring prior to 1985 was found, but spill records dated prior to 1985 have not been validated as complete because of missing or incomplete documentation (Hart Crowser, 2000; Robertson et al., 2013).

As noted above, eight spills ≥500 bbls are documented from 1985 to 2013; one of which was ≥1,000 bbl. For that same time period the total ANS production was 12.80 Bbbl of crude oil and condensate (Alyeska Pipeline Service Company, 2013).

The ANS spill rates for crude oil spills ≥500 bbl from 1985-2013 are:

- 0.63 total spills per Bbbl of oil produced
- 0.39 facility spills per Bbbl of oil produced and
- 0.24 pipeline spills per Bbbl of oil produced.

The ANS spill rates for crude oil spills ≥1,000 bbl from 1985-2013 are:

- 0.08 total spills per Bbbl of oil produced

A-8.3.2. Trans-Alaska Pipeline Large Crude Oil Spill Rate 1977-2013 and 1985-2013 Based on Volume and Pipeline-Mile-Year

Flow in the Trans-Alaska Pipeline System (TAPS) began on June 20, 1977, with throughput of 112 million bbl by the end of 1977. Throughput increased to almost 400 million bbl in 1978, peaked at 744 million bbl in 1988, and was 182 million bbl in 2013. The estimated total volume transported through the TAPS during the period 1977 through 2013 is 16.7 Bbbl (Alyeska Pipeline Service Company, 2013). The TAPS is 800.302 miles long.

1977-2013

There have been nine crude oil spills ≥ 500 bbl attributed to TAPS operation, eight of which were ≥ 1,000 bbl. The last spill ≥ 1,000 bbl occurred in 2010 at Pump Station 9. The spill rate of 0.54 spills for spills ≥ 500 bbl of spills per Bbbl transported for TAPS pipeline was calculated based on the record of seven accidental and two sabotage spills over 16.7 Bbbl of production. The spill rate of 0.0003078 large spills per pipeline-mile-year for TAPS was calculated based on the record of seven accidental and two sabotage spills over 29,238 pipeline-mile-years during the period 1977 through 2013.

1985-2013

There have been three crude oil spills ≥ 500 bbl, of which two were ≥ 1,000 bbl. The spill rate of 0.23 spills for spills ≥ 500 bbl of spills per Bbbl transported for TAPS was calculated based on the record of three accidental spills over 12.8 Bbbl of production. The spill rate of 0.0001293 large spills per pipeline-mile-year for TAPS was calculated based on the record of two accidental and one sabotage spill over 23,208 pipeline-mile-years during the period 1985 through 2013.

A-8.4. Estimating Potential Large Spills from Past, Present and Future Production

An important element in estimating environmental impacts associated with oil and gas activities on the North Slope and adjacent Beaufort and Chukchi seas is accidental large oil spills. Oil production has occurred on the North Slope since the mid-1970s. Accidental spills of crude oil have occurred on the North Slope due to oil and gas exploration and production (NRC, 2003b). The average volume of crude oil spilled annually to 2000 from the ANS operations and the TAPS segment from Pump Station 1 to Atigun Pass is 523 bbl of crude oil and 278 bbl of product (Niebo, pers. comm., as cited by NRC, 2003b). Environmental effects of small spills are generally less significant than large spills because they typically occur on pads or roads and are contained and cleaned up at the site of the spill. Therefore, small spills are less likely to cause adverse environmental effects (NRC, 2003b). The largest 10 percent of ANS crude spills accounted for 87 percent of the volume spilled (NRC, 2003b; Robertson et al. 2013). For purposes of analysis of cumulative oil spills, the discussion below focuses on large crude oil spills.

The history of ANS large volume crude spills is discussed to set the framework of previous large oil spills from oil and gas production. Generally, the frequency of large oil spills is decreasing through time as both regulation and technology have been able to address the causal factors of past large oil spills (Schmidt-Etkin, 2011). Between 1985 and 2013 there were eight crude oil spills of 500 or more bbl onshore on the North Slope while producing 12.8 Bbbl. One of these spills was ≥ 1,000 bbl. That was the GC-2 spill of 2006 in which 5,054 bbl leaked from a pipeline. The total volume of these eight large spills was approximately 9,800 bbl. No large (≥ 1,000 bbl) offshore U.S. Arctic (State and Federal) spills from oil and gas exploration and production have occurred to date. One large offshore spill of diesel heating fuel (1,619 bbl), from a punctured fuel barge, occurred north of Flaxman Island in the Beaufort Sea on August 20, 1988 but was not related to the oil and gas industry (USDOC, NOAA, 1988). Nine large TAPS pipeline oil spills (≥ 500 bbl) have occurred from 1977-2013 while

transporting 16.7 Bbbl. The total volume of the nine large TAPS spills was approximately 46,000 bbl, based on the high spill volume estimates, with three of those spills occurring on the ANS totaling approximately 11,400 bbl.

To estimate the assumed number of large oil spills for the cumulative effects analysis, BOEM used a production estimate. The production estimate includes past, present, and future production for the ANS and U.S. Beaufort and Chukchi seas. For cumulative case analysis, estimates are made for past, present and future production for the onshore ANS, State Beaufort Sea and adjacent OCS Beaufort and Chukchi OCS areas. Tables 5-4 and 5-5 in Chapter 5 showed the past, present, and reasonably foreseeable oil and gas fields, pools, satellites, and discoveries considered. The estimates for past activities include remaining proven reserves in already developed fields. The estimates for present activities include proven and probable resources reported for discovered fields expected to be developed in the near future. The estimates for future activities are based on undiscovered resources that may or may not become future commercial projects under favorable conditions. Estimates for future production are much more uncertain because the fields have not been discovered and the favorable economic factors cannot be guaranteed for decades into the future

To estimate an assumed number of large oil spills for purposes of cumulative analysis, the estimated production volumes were multiplied by the appropriate large spill occurrence rate per Bbbl produced as shown in Table A.1-32. The TAPS pipeline, onshore ANS, and the Alaska OCS have varying large spill rates and spill-size categories. For a summary of the spill rates and spill size categories that were assumed for analysis of oil spills in the cumulative case, see Table A.1-32. One noteworthy fact is that most oil originating from either onshore or offshore on the North Slope of Alaska flows through the TAPS pipeline and into TAPS tankers. The TAPS spills were considered within the geographic scope of the ANS

The incremental contribution of the Proposed Action (by the number of large spills) is about 20-25 percent of the cumulative case total estimate.

The estimated spills within National Petroleum Reserve Alaska (NPR-A) could occur within the area open for leasing. The estimated Colville Canning/State Beaufort Sea large spills could occur either in the offshore state waters of the Beaufort Sea or onshore from facilities and pipelines between the Colville and Canning River. Future discoveries of unconventional oil from shale gas or increased production of heavy oil are not included in the Colville Canning/State Beaufort Sea estimates.

BOEM estimates two OCS platform/rig large spills could occur in offshore OCS water from the Alternatives I, III or IV. The estimated Arctic OCS large pipeline spills could occur offshore. For purposes of analysis, the estimated large OCS pipeline spills were allocated to offshore. Onshore, it is assumed that one small pipeline spill of 700 bbls would occur along a 300-mile onshore pipeline traversing the NPR-A and other North Slope lands from the Chukchi Sea to TAPS Pump Station 1.

The estimated six large TAPS pipeline spills includes all large spills that could occur over the entire length of the TAPS pipeline, pump stations, and associated tank farms. For purposes of analysis, two of the spills were assigned to the North Slope based on the historical geographical location of large TAPS pipeline spills. The other four spills were assigned to the rest of the geographic extent of the TAPS pipeline.

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A.1. Supporting Tables and Maps

Table A.1-1. Large and Small Spill Sizes, Source of Spill, Type of Oil, Number and Size of Spill and Receiving Environment BOEM Assumes for Analysis in Chukchi Sea Lease Sale 193 Leased Area.

Second SEIS Section	Source of Spill	Type of Oil	Number and Size of Spill(s) (in bbl)	Receiving Environment
Large Spills[1] (≥1,000 bbl)				
4.3 Scenario Through Time	Offshore	Crude Condensate Or Diesel	2 spill(s)	Containment Open Water Under Ice On Top of Sea Ice Broken Ice Coastal Shoreline
	Pipeline Platform/ StorageTank/Well		5,100 Or 1,700 bbl	
Small Spills[1] (< 1,000 bbl)				
4.3 Scenario Through Time	Offshore and/or Onshore	Total Below	~800 spills	Containment, Open Water, On Top of Sea Ice, Broken Sea Ice, Snow/Ice, Tundra, Coastal Shoreline
	Operational Spills from All Sources	Crude Condensate or Diesel	~220 spills Median 3 bbl; 2 up to 700 bbl	
		Refined	~35 spills Exploration and Delineation	
			~520 spills Development and Production	

Note: 1 These numbers are for Alternatives I, III or IV.
Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1- 2. Exploration Spills on the Beaufort Sea and Chukchi Sea OCS (1981-2012).

Lease No.	Sale Area	Operator	Date	Facility	Oil	Amt. (Gal)	Cause of Spill	Response Action	Rec. (gal)
0344	71	Sohio	7/22/1981	Mukluk Island	Diesel	0.50	Leaking line on portable fuel trailer	Sorbents used to remove spill. Contaminated gravel removed.	0.05
0344	71	Sohio	7/22/1981	Mukluk Island	Diesel	1.00	Overfilled fuel tank on equipment	Sorbents used to remove spill. Contaminated gravel removed.	1.00
0280	71	Exxon	8/7/1981	Beaufort Sea I	Hydraulic Fluid	1.00	Broken hydraulic line on ditch witch.	Fluid picked up with shovels.	1.00
0280	71	Exxon	8/8/1981	Beaufort Sea I	Trans. Fluid	0.25	Overfilling of transmission fluid.	Fluid picked up and placed in plastic bags.	0.25
0280	71	Exxon	1/11/1982	Beaufort Sea I	Hydraulic Fluid	0.50	Broken hydraulic line.	Fluid picked up and stored in plastic bags.	0.50
0280	71	Exxon	1/11/1982	Alaska Beaufort Sea I	Diesel	3.00	Overfilled catco 90-3 tank.	Fluid picked up.	3.00
0280	71	Exxon	1/17/1982	Beaufort Sea I	Diesel	1.00	Tank on catco 90-14 overfilled.	Fluid picked up and stored in plastic bags.	1.00
0280	71	Exxon	1/21/1982	Beaufort Sea I	Hydraulic Fluid	0.25	Broken hydraulic line on ditch witch.	Fluid picked up.	0.25
0371	71	Amoco	3/16/1982	Sandpiper Gravel Island	Unknown	1.00	Seeping from Gravel Island.	Sorbent pads.	Unk
0849	87	Union Oil	9/4/1982	Canmar Explorer II	Unknown	1.00	Transfer of test tank from drillship to barge.	None	None
0871	87	Shell Western	9/5/1982	Canmar Explorer II	Light Oil	0.50	Washing down cement unit, drains not plumbed to oil/water separator.	None	None
N/A	87	Shell	9/14/1982	Canmar II Drillship	Diesel	30.00	Tank vent overflowed during fuel transfer.	Deployed sorbent pads and pump.	30.00
0191	BF	Exxon	11/11/1982	Beechey Pt. Gravel Is.	Lube Oil	1.00	Loader tipped over lube oil drum	Oil cleaned up with sorbents. Contaminated gravel removed	1.00
0191	BF	Exxon	1/15/1983	Beechey Pt. Gravel Is.	Diesel	0.12	Fuel truck spilled diesel as it climbed a 40 degree ramp to island	Sorbents used and contaminated gravel removed	0.12
0191	BF	Exxon	1/23/1983	Beechey Pt. Gravel Is.	Hydraulic Fluid	2.50	Hydraulic line on backhoe broke	1 gallon in water. Boom deployed with sorbents, Contaminated gravel removed	2.50
0191	BF	Exxon	8/29/1983	Beechey Pt. Gravel Is.	Hydraulic Fluid	0.20	Hydraulic line on backhoe broke	Spill contained on island surface. Sorbents used and contaminated gravel removed.	0.25
0196	BF	Shell	8/30/1983	Ice Road to Tern Island	Hydraulic Fluid	10.0	Broken hydraulic line on rollogon	Unknown	Unk
0191	BF	Exxon	2/26/1985	Beechey Pt. Gravel Is.	Hydraulic Fluid	0.37	Hydraulic line broke	Contaminated Snow Removed	0.37
0196	BF	Shell	3/1/1985	Ice Road to Tern Island	Hydraulic Fluid	3.00	Hydraulic line broke	Unknown	3.00

Lease No.	Sale Area	Operator	Date	Facility	Oil	Amt. (Gal)	Cause of Spill	Response Action	Rec. (gal)
0191	BF	Exxon	3/2/1985	Beechey Pt. Gravel Is.	Gasoline	0.01	Operational Spill	Snow shoved into plastic bag.	0.01
0191	BF	Exxon	3/4/1985	Beechey Pt. Gravel Is.	Waste Oil	2.00	Drum of waste oil punctured	Snow recovered	2.00
0196	BF	Shell	3/4/1985	Tern Gravel Island	Crude Oil	1.00	Well Separator overflowed, crude oil escaped	Line boom deployed	Unk
0196	BF	Shell	3/6/1985	Tern Gravel Island	Crude Oil	15.00	Test burner was operating poorly	Containment Boom deployed	Unk
0196	BF	Shell	9/24/1985	Tern Gravel Island	Crude Oil	2.00	Oil released from steam heat coil when Halliburton tank moved	Sorbents and hand shovel used	2.00
0191	BF	Shell	10/4/1985	Enroute to Tern Gravel Island	Jet fuel B	800.00	Wire sling broke during helicopter transport of fuel blivits	Contaminated Snow Removed. Test holes drilled with no fuel below snow.	Unk
0196	BF	Shell	10/29/1985	Tern Gravel Island	Crude Oil	2.00	Test oil burner malfunction	Contaminated snow removed	2.00
0196	BF	Shell	6/27/1986	Tern Gravel Island	Crude Oil	3.00	Test oil burner malfunction	Spray picked up with sorbents. Bladed up dirty snow.	2.00
0943	87	Tenneco	1/24/1988	SSDC/MAT	Gear oil	220.0	Helicopter sling failure during transfer of drums to SSDC	Scooped up contaminated snow and ice	220.0
1482	109	SWEPI	7/7/1989	Explorer III Drillship	Hydraulic fluid	10.0	Hydraulic line connector	Sorbent pads	0.84
1092	97	AMOCO	10/1/1991	CANMAR Explorer	Hydraulic fluid	2.00	Hydraulic line rupture	None	None
0865	87	ARCO	7/24/1993	Beaudril Kulluk	Diesel	0.06	Residual fuel in bilge water	None	None
0866	87	ARCO	9/8/1993	CANMAR Kulluk	Hydraulic fluid	1.26	Seal on shale shaker failed	None	None
0866	87	ARCO	9/24/1993	CANMAR Kulluk	Fuel	4.00	Fuel transfer in rough weather	3 gal on deck of barge recovered, none in sea	3.00
1597	124	ARCO	10/31/1993	CANMAR Kulluk	Fuel	0.50	Released during emptying of disposal caisson	None	None
1585	124	BP Alaska	1/20/1997	Ice Road to Tern Island	Diesel, Hydraulic Fluid	10.5	Truck went through ice; fuel line ruptured	Scooped up contaminated snow and ice. Some product entered water	Unk
2280	193	Noble Drililing US	9/24/2012	D/V Noble Discoverer	Hydraulic Oil	0.004	Unknown Leak	None	None

Source: USDOI, BOEM, Alaska OCS Region (2014).
Note: Unk = Unknown

Table A.1-3. Land Segment (LS) ID and the Percent Type of Environmental Sensitivity Index Shoreline Closest to the Ocean for United States, Alaska Shoreline.

LS ID	Geographic Place Names	1A	1B	1C	3A	3B	3C	4	5	6A	6B	6C	7	8A	8B	8C	8E	9A	9B	10A	10B	10E	U
40	Lopp Lagoon, Mint River	-	-	-	21	-	3	1	23	-	-	-	6	-	-	-	21	7	1	2	-	15	-
41	Ikpek, Ikpek Lagoon	-	-	-	16	-	6	-	-	-	-	-	12	-	-	-	21	7	2	16	-	19	2
42	Arctic Lagoon, Nuluk River	-	-	-	1	-	3	1	7	-	-	-	1	-	-	-	30	6	14	2	-	34	1
43	Sarichef Island	-	-	-	-	-	13	4	1	-	-	-	12	-	-	-	27	7	1	4	-	32	-
44	Cape Lowenstern, Shishmaref	-	-	-	6	-	8	-	-	-	-	1	7	-	-	-	32	6	4	6	-	31	-
45	LS45	-	-	-	17	-	-	-	-	-	-	-	1	-	-	-	25	7	9	-	-	40	2
46	Kalik & Singeakpuk River	-	-	-	13	-	2	-	-	-	-	-	4	-	-	-	38	7	12	-	-	24	-
47	Kitluk River	-	-	-	13	-	1	-	-	-	-	-	32	-	-	-	20	2	24	-	-	-	7
48	Cape Espenberg	-	-	-	13	-	1	-	10	-	-	-	2	-	-	-	7	8	-	25	-	20	14
49	Pish River	-	-	-	19	-	-	-	15	-	-	-	-	-	-	-	14	5	3	20	-	24	-
50	Goodhope Bay & River	1	-	3	4	-	-	4	22	4	12	-	-	-	-	-	12	-	-	4	-	35	-
51	Deering	1	-	11	15	-	-	-	23	6	4	-	-	-	-	-	12	2	1	24	-	-	1
52	Willow Bay	2	5	4	9	-	-	-	35	1	1	-	-	-	1	-	1	-	-	32	-	7	-
53	Kiwalik	-	-	-	3	-	-	-	18	-	-	-	-	2	1	-	-	3	-	13	-	43	15
54	Baldwin Peninsula	-	-	-	15	-	8	-	68	-	-	-	-	1	-	-	2	-	-	-	-	6	-
55	Cape Blossom, Pipe Spit	-	-	-	1	-	6	-	78	1	1	-	-	-	-	-	4	-	-	7	-	1	-
56	Kotzebue, Noatak River	-	1	-	-	-	3	-	13	-	-	1	-	-	-	-	8	9	1	5	-	23	38
57	Aukulak Lagoon	-	-	-	4	-	2	-	18	-	-	-	-	-	-	-	19	7	3	5	-	28	14
58	Cape Krusenstern	-	-	-	-	-	1	-	32	-	1	-	-	-	-	-	17	-	1	22	-	26	-
59	Imik, Ipiavik & Kotlik Lagoon	-	-	-	1	-	-	-	48	4	-	-	-	-	-	-	6	4	-	35	-	2	-
60	Kivalina, Kivalina & Wulik River	-	-	-	-	-	2	1	46	3	-	1	-	-	-	1	19	5	7	9	-	6	-
61	Cape Seppings	-	-	-	-	-	-	-	54	-	-	-	-	-	-	-	9	-	11	6	-	19	-
62	Atosik Lagoon	-	-	-	-	-	-	-	76	-	-	-	-	-	-	-	1	-	17	5	-	1	-
63	Asikpak Lag., Cape Seppings	-	-	1	5	-	1	1	46	11	-	-	19	-	-	-	10	3	1	1	-	-	-
64	Kukpuk River, Point Hope	1	-	2	8	-	1	2	42	4	-	-	12	-	-	-	16	4	6	-	-	1	-
65	Buckland, Cape Lisburne	13	-	2	-	-	-	-	71	10	3	-	-	-	-	-	-	-	-	1	-	-	-
66	Ayugatak Lagoon	54	-	-	-	-	-	-	32	1	-	-	-	-	-	-	-	-	-	12	-	-	-
67	Cape Sabine, Pitmegea River	38	-	3	-	-	15	-	22	1	-	-	-	-	-	-	-	-	-	19	-	-	-
68	Agiak Lagoon, Punuk Lagoon	-	-	-	-	-	11	-	76	11	-	-	-	-	-	-	-	-	-	1	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	44	47	-	-	-	-	-	-	-	-	-	2	-	6	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	20	-	-	-	20	-	-	-	14	1	21	2	-	19	2
71	Kukpowruk River, Sitkok Point	-	-	-	4	-	9	-	35	-	-	-	21	-	-	-	5	19	4	-	-	2	1
72	Point Lay, Siksrikpak Point	-	-	-	4	-	2	-	49	-	-	-	8	-	-	-	12	15	-	5	-	3	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	8	-	52	-	-	-	-	-	-	1	4	15	5	10	-	4	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	15	-	-	-	28	1	-	-	1	-	-	-	5	41	2	5	-	-	1
75	Akeonik, Icy Cape	-	-	-	13	-	4	1	34	-	-	-	2	-	-	-	14	14	11	5	1	1	-
76	Avak Inlet, Tunalik River	-	-	-	2	-	8	3	40	-	-	-	1	-	-	-	13	11	8	1	-	13	-
77	Nivat Point, Nokotlek Point	-	-	-	13	-	3	6	42	-	-	-	9	-	-	-	12	9	4	-	-	1	-
78	Point Collie, Sigeakruk Point	-	-	-	15	-	5	-	38	-	-	-	19	-	-	-	-	4	7	-	-	5	8
79	Point Belcher, Wainwright	-	-	-	22	-	1	-	33	2	1	-	32	-	-	-	2	-	-	1	-	5	-
80	Eluksingiak Point, Kugrua Bay	-	-	-	13	-	35	-	10	-	-	-	12	-	-	-	14	9	-	1	-	5	1
81	Peard Bay, Point Franklin	-	-	-	3	-	21	-	37	1	-	-	25	-	-	-	3	9	-	-	-	-	-
82	Skull Cliff	-	-	-	-	-	76	2	12	9	-	-	1	-	-	-	-	-	1	-	-	-	-
83	Nulavik, Loran Radio Station	-	-	-	-	-	73	-	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84	Will Rogers & Wiley Post Mem.	-	-	-	1	-	8	-	82	-	-	-	-	-	-	-	-	-	8	-	-	-	-
85	Barrow, Browerville, Elson Lag.	-	-	-	11	-	14	-	37	-	-	-	1	-	-	-	17	2	2	3	-	7	7
86	Dease Inlet, Plover Islands	-	-	-	30	3	5	-	3	-	-	-	2	-	-	-	19	15	3	11	-	9	-
87	Igalik & Kulgurak Island	-	-	-	17	-	4	-	3	-	-	-	-	-	-	-	25	7	-	9	-	34	1
88	Cape Simpson, Piasuk River	-	-	-	6	-	5	6	-	-	-	-	-	-	-	-	14	-	-	-	-	25	44
89	Ikpikpuk River Point Poleakoon	-	-	-	2	-	4	-	-	-	-	-	-	-	-	-	4	57	-	-	-	13	20
90	Drew & McLeod Point, Kolovik	-	-	-	5	-	19	7	-	-	-	-	-	-	-	-	14	16	-	11	-	27	-
91	Lonely, Pitt Pt., Pogik Bay, Smith R	-	-	-	-	-	4	9	7	-	-	-	-	-	-	-	12	5	-	6	-	38	18

LS ID	Geographic Place Names	1A	1B	1C	3A	3B	3C	4	5	6A	6B	6C	7	8A	8B	8C	8E	9A	9B	10A	10B	10E	U
92	Cape Halkett, Garry Creek	-	-	-	1	-	20	3	-	-	-	-	-	-	-	-	26	2	-	-	-	31	18
93	Atigaru Pt, Eskimo Isl., Kogru R.	-	-	-	9	-	30	2	1	-	-	-	-	-	-	-	20	1	3	1	-	34	-
94	Fish Creek, Tingmeachsiovik River	-	-	-	1	-	4	-	1	-	-	-	-	-	-	-	6	34	-	1	-	38	16
95	Colville River	-	-	-	5	-	1	-	-	-	-	-	-	-	-	-	10	31	-	1	-	2	50
96	Oliktok Point	-	-	-	4	-	8	12	10	3	-	-	-	-	-	-	11	10	-	9	-	32	1
97	Milne Point, Simpson Lagoon	-	-	-	6	-	2	37	19	-	-	-	-	-	-	-	17	1	5	4	-	8	2
98	Kuparuk River	-	-	-	1	-	1	-	36	-	-	-	-	1	-	-	7	21	3	1	-	16	11
99	Point Brower, Prudhoe Bay	-	-	-	2	-	5	-	1	-	-	-	-	-	1	-	12	55	-	11	-	7	4
100	Foggy Island Bay, Kadleroshilik R.	-	-	-	6	-	4	4	15	1	-	-	-	-	-	-	7	31	-	5	-	22	4
101	Bullen, Gordon & Reliance Points	-	-	-	7	-	4	3	44	-	-	-	-	-	-	-	2	2	-	12	-	22	3
102	Pt. Hopson & Sweeney, Staines R	-	-	-	2	-	4	12	35	3	-	-	4	-	-	-	16	6	-	3	-	17	-
103	Brownlow Point, Canning River	-	-	-	21	-	6	3	7	-	-	-	-	-	-	-	5	43	-	-	-	8	8
104	Collinson Point, Konganevik Point	-	-	-	21	-	13	-	21	-	-	-	2	-	-	-	10	11	6	-	-	15	-
105	Anderson Point, Sadlerochit River	-	-	-	18	-	3	-	24	-	-	-	22	-	-	-	1	13	4	1	-	14	-
106	Arey Island, Barter Island,	-	-	-	11	-	3	1	13	-	-	-	-	-	-	-	9	45	-	-	-	14	1
107	Kaktovik	-	-	-	-	-	10	3	45	-	-	-	-	-	1	-	7	17	1	-	-	4	11
108	Griffin Point, Oruktalik Lagoon	-	-	-	-	-	20	2	43	-	-	-	-	-	-	-	13	2	2	1	-	16	-
109	Angun Point, Beaufort Lagoon	-	-	-	-	-	18	30	23	-	-	-	-	-	-	-	14	4	1	-	-	7	3
110	Icy Reef, Kongakut River, Siku Lagoon	-	-	-	-	-	-	3	26	-	-	-	-	-	-	-	2	28	1	-	-	38	3
111	Demarcation Bay & Point	-	-	-	1	-	15	3	54	-	-	-	-	-	-	-	6	7	3	-	-	5	5

Source: USDOI, BOEM (2014) from Harper and Morris (2014)
Key:

ID = identification (number). Number Description		
1A Exposed rocky shores; exposed rocky banks	6A Gravel beaches; Gravel beaches (granules and pebbles) *	8E Peat shorelines
1B Exposed, solid man-made structures	6B Gravel beaches (cobbles and boulders) *	9A Sheltered tidal flats
1C Exposed rocky cliffs with boulder talus base	6C Rip rap (man-made) *	9B Vegetated low banks
3A Fine- to medium-grained sand beaches	7 Exposed tidal flats	10A Salt- and brackish-water marshes
3B Scarps and steep slopes in sand	8A Sheltered scarps in bedrock, mud, or clay; Sheltered rocky shores (impermeable) *	10B Freshwater marshes
3C Tundra cliffs	8B Sheltered, solid man-made structures; Sheltered rocky shores (permeable) *	10E Inundated low-lying tundra
4 Coarse-grained sand beaches	8C Sheltered rip rap	U Unknown
5 Mixed sand and gravel beaches	8D Sheltered rocky rubble shores	

Table A.1-4 Fate and Behavior of a Hypothetical 5,100-Barrel Diesel Oil Spill from a Platform in the Chukchi Sea.

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	86	54	5	1	92	73	36	2
Oil Dispersed (%)	7	26	65	68	1	7	29	51
Oil Evaporated (%)	7	20	30	31	7	20	36	47

Source: USDOI, BOEM, Alaska OCS Region (2014)
Note: The notes following Table A.1-6 apply.

Table A.1-5. Fate and Behavior of a Hypothetical 5,100-Barrel Condensate Oil Spill from a Platform in the Chukchi Sea.

	Summer Spill1				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	11	0	na	na	17	5	0	na
Oil Dispersed (%)	12	21	na	na	3	11	15	na
Oil Evaporated (%)	77	79	na	na	80	84	85	na

Source: USDOI, BOEM, Alaska OCS Region (2014)
Note: The notes following Table A.1-6 apply.

Table A.1-6. Fate and Behavior of a Hypothetical 1,700-Barrel Condensate Oil Spill from a Pipeline in the Chukchi Sea.

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	7	0	na	na	13	6	0	na
Oil Dispersed (%)	15	21	na	na	5	10	15	na
Oil Evaporated (%)	78	79	na	na	82	84	85	na

Notes: Calculated with the SINTEF oil-weathering model Version 4.0 of Reed et al. (2005) and assuming an Sliepner Condensate or Marine Diesel type.

[1] Summer (July 1-October 31), 8-knot wind speed, 3 degrees Celsius, 0.4-meter wave height.

[2] Meltout Spill (November 1-May 31). Spill is assumed to occur into first-year pack ice, pools 2-centimeter thick on ice surface for 2 days at -1 degrees Celsius prior to meltout into 50% ice cover, 10-knot wind speed, and 0.1 meter wave heights.

na means not applicable.

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-7. Fate and Behavior of a Hypothetical 5,100-Barrel Crude Oil Spill from a Platform in the Chukchi Sea.

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	70	65	57	44	72	67	62	56
Oil Dispersed (%)	1	2	6	16	0	1	2	3
Oil Evaporated (%)	29	33	37	40	28	33	37	40
Discontinuous Area (km2)[3, 4]	13	54	256	1063	4	18	85	351
Estimated Coastline Oiled (km) [5]	44				54			

Note: Notes following Table A.1-8 apply.

Table A.1-8 Fate and Behavior of a Hypothetical 1,700-Barrel Crude Oil Spill from a Pipeline in the Chukchi Sea.

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	70	65	57	44	71	67	62	53
Oil Dispersed (%)	1	2	6	16	0	1	2	4
Oil Evaporated (%)	29	33	37	40	29	33	37	40
Discontinuous Area (km2)[3, 4]	8	31	148	615	3	10	25	200
Estimated Coastline Oiled (km) [5]	26				32			

Notes: Calculated with the SINTEF oil-weathering model Version 4.0 of Reed et al. (2005) and assuming an Alpine Composite crude type.

[1] Summer (July 1-October 31), 8-knot wind speed, 3 degrees Celsius, 0.4-meter wave height.

[2] Meltout Spill (November 1-May 31). Spill is assumed to occur into first-year pack ice, pools 2-centimeter thick on ice surface for 2 days at -1 degrees Celsius prior to meltout into 50% ice cover, 10-knot wind speed, and 0.1 meter wave heights.

[3] This is the discontinuous area of oiled surface.

[4] Calculated from Equation 6 of Table 2 in Ford (1985) and is the discontinuous area of a continuing spill or the area swept by an instantaneous spill of a given volume. Note that ice dispersion occurs for about 30 days before meltout.

[5] Calculated from Equation 17 of Table 4 in Ford (1985) and is the result of stepwise multiple regressions for length of historical coastline affected.

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-9. Identification Number (ID) and Name of Environmental Resource Areas, Represented in the Oil-Spill-Trajectory Model and Their Location on Environmental Resource Area Maps and Tables.

ID	NAME	GENERAL RESOURCE	MAP A-	Table A.1-
1	Kasegaluk Lagoon Area	Birds, Barrier Island, Seals, Whales	2f	10, 11
2	Point Barrow, Plover Islands	Birds, Barrier Island	2d	10
3	SUA: Uelen/Russia	Subsistence	2a	12
4	SUA:Naukan/Russia	Subsistence	2b	12
5	SUA: Shishmaref, North	Subsistence, Marine Mammals	2a	12
6	Hanna Shoal	Lower Trophics, Seals	2a	16
7	Krill Trap	Lower Trophics	2d	16
8	Maguire, Flaxman Islands	Birds, Barrier Island	2f	10
9	Stockton Islands, McClure Islands	Birds, Barrier Island	2e	10
10	Ledyard Bay SPEI Critical Habitat Area	Birds	2b	10
11	Wrangel Island 12 nmi & Offshore	Marine Mammals	2a	13
12	SUA: Nuiqsut - Colville Delta	Subsistence	2d	12
13	Kotzebue Sound	Subsistence, Whales	2a	12
14	Cape Thompson Seabird Colony Area	Birds	2a	10
15	Cape Lisburne Seabird Colony Area	Birds, Marine Mammals	2b	10, 13
16	Barrow Canyon	Lower Trophics	2d	16
17	Angun and Beaufort Lagoons	Birds, Barrier Island	2e	10
18	Murre Rearing and Molting Area	Birds	2a	10
19	Chukchi Spring Lead System	Birds	2f	10
20	East Chukchi Offshore	Whales	2b	11
21	AK BFT Bowhead FM 1	Whales	2e	11
22	AK BFT Bowhead FM 2	Whales	2e	11
23	Polar Bear Offshore	Marine Mammals	2a	13
24	AK BFT Bowhead FM 3	Whales	2e	11
25	AK BFT Bowhead FM 4	Whales	2e	11
26	AK BFT Bowhead FM 5	Whales	2e	11
27	AK BFT Bowhead FM 6	Whales	2e	11
28	AK BFT Bowhead FM 7	Whales	2e	11
29	AK BFT Bowhead FM 8	Whales	2e	11
30	Beaufort Spring Lead 1	Whales	2d	11
31	Beaufort Spring Lead 2	Whales	2d	11
32	Beaufort Spring Lead 3	Whales	2d	11
33	Beaufort Spring Lead 4	Whales	2d	11
34	Beaufort Spring Lead 5	Whales	2d	11
35	Beaufort Spring Lead 6	Whales	2d	11
36	Beaufort Spring Lead 7	Whales	2d	11
37	Beaufort Spring Lead 8	Whales	2d	11
38	SUA: Pt. Hope - Cape Lisburne	Subsistence	2f	12
39	SUA: Pt. Lay - Kasegaluk	Subsistence	2c	12
40	SUA: Icy Cape - Wainwright	Subsistence	2a	12
41	SUA: Barrow - Chukchi	Subsistence	2c	12
42	SUA: Barrow - East Arch	Subsistence	2f	12
43	SUA: Nuiqsut - Cross Island	Subsistence	2d	12
44	SUA: Kaktovik	Subsistence	2d	12
45	Beaufort Spring Lead 9	Whales	2d	11
46	Wrangel Island 12 nmi Buffer 2	Marine Mammals	2a	14
47	Hanna Shoal Walrus Use Area	Marine Mammals	2c	13
48	Chukchi Lead System 4	Marine Mammals	2c	14
49	Chukchi Spring Lead 1	Whales	2a	11
50	Pt Lay Walrus Offshore	Marine Mammals	2f	13
51	Pt Lay Walrus Nearshore	Marine Mammals	2a	13
52	Russian Coast Walrus Offshore	Marine Mammals	2b	13
53	Chukchi Spring Lead 2	Whales	2f	11
54	Chukchi Spring Lead 3	Whales	2f	11
55	Point Barrow, Plover Islands	Marine Mammals, Barrier Islands	2e	13
56	Hanna Shoal Area	Whales	2b	11
57	Skull Cliffs	Lower Trophics	2e	11
58	Russian Coast Walrus Nearshore	Marine Mammals	2b	13
59	Ostrov Kolyuchin	Marine Mammals	2b	13
60	King Pt.-Shallow Bay	Subsistence, Whales	2e	11, 12
61	Pt Lay-Barrow BH GW SFF	Whales	2b	11

ID	NAME	GENERAL RESOURCE	MAP A-	Table A.1-
62	Herald Shoal Polynya 2	Marine Mammals	2a	14
63	North Chukchi	Whales	2a	11
64	Peard Bay Area	Birds, Marine Mammals	2f	10
65	Smith Bay	Birds, Marine Mammals, Whales	2d	10, 11
66	Herald Island	Marine Mammals	2a	13
67	Herschel Island (Canada)	Birds	2d	10
68	Harrison Bay	Birds, Fish, Marine Mammals	2e	10
69	Harrison Bay/Colville Delta	Birds, Marine Mammals	2f	10
70	North Central Chukchi	Whales	2a	11
71	Simpson Lagoon, Thetis and Jones Island	Birds	2d	10
72	Gwyder Bay, West Dock, Cottle and Return Islands	Birds	2f	10
73	Prudhoe Bay	Birds	2e	10
74	Offshore Herald Island	Whales	2a	11
75	Boulder Patch Area	Lower Trophics	2f	16
76	Kendall Island Bird Sanctuary (Canada)	Birds	2d	10
77	Sagavanirktok River Delta/Foggy Island Bay	Birds	2f	10
78	Mikkelsen Bay	Birds	2f	10
79	Demarcation Bay Offshore	Birds	2d	10
80	Beaufort Outer Shelf 1	Lower Trophics	2d	16
81	Simpson Cove	Birds	2e	10
82	N Chukotka Nrshr 2	Whales	2a	11
83	N Chukotka Nrshr 3	Whales	2a	11
84	Canning River Delta	Fish	2d	15
85	Sagavanirktok River Delta	Fish	2e	15
86	Harrison Bay	Fish	2f	15
87	Colville River Delta	Fish	2e	15
88	Simpson Lagoon	Fish	2f	15
89	Mackenzie River Delta	Fish	2e	15
90	SUA: Gary & Kendall Is./Canada	Subsistence	2e	12
91	Hope Sea Valley	Whales	2a	11
92	Thetis & Jones Isls., Cottle & Return Isls., West Dock	Marine Mammals, Barrier Islands	2e	13
93	Cross and No Name Island	Marine Mammals, Barrier Islands	2f	13
94	Maguire Islands, Flaxman Island, Barrier Islands	Marine Mammals, Barrier Islands	2e	13
95	Arey and Barter Islands and Bernard Spit	Marine Mammals, Barrier Islands	2f	13
96	Midway, Cross and Bartlett Islands	Birds	2e	10
97	SUA: Tigvariak Island	Subsistence	2e	12
98	Anderson Point Barrier Islands	Birds, Barrier Island	2e	10
99	Arey and Barter Islands, Bernard Spit	Birds, Barrier Island	2e	10
100	Jago and Tapkaurak Spits	Birds, Barrier Island	2e	10
101	Beaufort Outer Shelf 2	Lower Trophics	2d	16
102	Opilio Crab EFH	Opilio Crab Habitat (EFH)	2b	15
103	Saffron Cod EFH	Saffron Cod Habitat (EFH)	2c	15
104	Kotzebue Sound	Fish, Marine Mammals	2a	15, 14
105	Fish Creek	Fish	2e	15
106	Shaviovik River	Fish	2d	15
107	Pt Hope Offshore	Whales	2f	11
108	Barrow Feeding Aggregation	Whales	2b	11
109	AK BFT Shelf Edge	Whales	2d	11
110	AK BFT Outer Shelf&Slope 1	Whales	2e	11
111	AK BFT Outer Shelf&Slope 2	Whales	2e	11
112	AK BFT Outer Shelf&Slope 3	Whales	2e	11
113	AK BFT Outer Shelf&Slope 4	Whales	2e	11
114	AK BFT Outer Shelf&Slope 5	Whales	2e	11
115	AK BFT Outer Shelf&Slope 6	Whales	2e	11
116	AK BFT Outer Shelf&Slope 7	Whales	2e	11
117	AK BFT Outer Shelf&Slope 8	Whales	2e	11
118	AK BFT Outer Shelf&Slope 9	Whales	2e	11
119	AK BFT Outer Shelf&Slope 10	Whales	2e	11
120	Russia CH GW Fall 1&2	Whales	2c	11
121	Cape Lisburne - Pt Hope	Whales	2c	11
122	North Chukotka Offshore	Whales	2a	11
123	AK Chukchi Offshore	Whales	2a	11
124	Central Chukchi Offshore	Whales	2b	11

Table A.1-10. Environmental Resource Areas Used in the Analysis of Large or Very Large Oil Spill Effects on Birds in Sections 4.3 and 4.4.

ERA	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
1	Kasegaluk Lagoon Area	A-2f	May-October	Birds, barrier island, seals, whales	Birds: BLBR, LTDU, eiders (STEI, COEI), loons (all 3 species)	Dau and Larned, 2004; Johnson, 1993; Johnson, Wiggins, and Wainwright, 1993; Laing and Platte, 1994; Lehnhausen and Quinlan, 1981.
2	Point Barrow, Plover Islands	A-2d	May-October	Birds, barrier island	Birds: SPEI, LTDU	Fischer and Larned, 2004; Troy, 2003.
8	Maguire, Flaxman Islands	A-2f	May-October	Birds, barrier island	Birds: nesting COEI, molting LTDU, PALO	Fischer and Larned, 2004; Flint et al., 2004; Johnson, Wiggins, and Wainwright, 1993; Johnson, 2000; Johnson et al., 2005; Noel et al., 2005.
9	Stockton Islands, McClure Islands	A-2e	May-October	Birds, barrier island	Birds: nesting COEI, molting LTDU, staging SPEI	Fischer and Larned, 2004; Flint et al., 2004; Johnson, Wiggins, and Wainwright, 1993; Johnson, 2000, (Table 2); Johnson et al., 2005; Noel et al., 2005; Troy, 2003.
10	Ledyard Bay SPEI Critical Habitat Unit	A-2b	July-November	Birds	Birds: seabirds, molting/staging SPEI, staging YBLO	66 FR 9146-9185; Laing and Platte, 1994; Petersen, Larned, and Douglas, 1999; Piatt and Springer, 2003.
14	Cape Thompson Seabird Colony Area	A-2a	May-October	Birds	Birds: seabirds, gulls, shorebirds, waterfowl, staging YBLO	Piatt et al., 1991; Piatt and Springer, 2003; Springer et al., 1984; Stephenson and Irons, 2003.
15	Cape Lisburne Seabird Colony Area	A-2b	May-October	Birds, marine mammals	Birds: seabird breeding colony, staging YBLO	Oppel, Dickson and Powell, 2009; Piatt et al., 1991; Piatt and Springer, 2003; Roseneau et al., 2000; Springer et al., 1984; Stephenson and Irons, 2003.
17	Angun and Beaufort Lagoons	A-2e	May-October	Birds, barrier island	Birds: molting LTDU, scoters, staging shorebirds	Johnson and Herter, 1989.
18	Murre Rearing and Molting Area	A-2a	May-October	Birds	Birds: murre foraging, rearing, and molting area	Piatt and Springer, 2003; Springer et al., 1984.
19	Chukchi Sea Spring Lead System	A-2f	April-June	Birds, whales	Birds: seabird foraging area; spring migration area for LTDU, eiders (KIEI, COEI), loons	Connors, Myers, and Pitelka, 1979; Gill, Handel, and Connors, 1985; Johnson and Herter, 1989; Oppel, Dickson, and Powell, 2009; Piatt et al., 1991; Piatt and Springer, 2003; Sowls, Hatch, and Lensink, 1978; Swartz, 1967.
64	Peard Bay Area	A-2f	May-October	Birds, marine mammals	Birds: eiders (all 4 species), loons (all 3 species)	Fischer and Larned, 2004; Laing and Platte, 1994.
65	Smith Bay	A-2d	May-October	Birds, marine mammals, whales	Birds: eiders (SPEI, KIEI), YBLO	Earnst et al., 2005; Powell et al., 2005; Ritchie, Burgess, and Suydam, 2000; Ritchie et al., 2004; Troy, 2003.
67	Herschel Island (Canada)	A-2d	May-October	Birds	Birds: LTDU, BLBR, scoters, eiders, loons, shorebirds	Johnson and Richardson, 1982; Richardson and Johnson, 1981.
68	Harrison Bay	A-2e	May-October	Birds, marine mammals	Birds: eiders (KIEI, COEI), scoters (BLSC, SUSC), geese (BLBR, CANG, GWFG), loons, shorebirds	Connors, Connors, and Smith, 1984; Dau and Larned, 2004, 2005; Fischer and Larned, 2004.
69	Harrison Bay/Colville Delta	A-2f	May-October	Birds, marine mammals	Birds: geese (BLBR), eiders (KIEI, COEI), LTDU, scoters (BLSC, SUSC), loons (all 3 species)	Bergman et al., 1977; Dau and Larned, 2004, 2005; Fischer and Larned, 2004; Johnson and Herter, 1989.
71	Simpson Lagoon, Thetis and Jones Islands	A-2d	May-October	Birds	Birds: geese (BLBR, LSGO, GWFG), eiders (COEI, KIEI), LTDU, scoters (SUSC, WWSC), shorebirds, loons (all 3 species)	Connors, Connors, and Smith, 1984; Divoky, 1984; Johnson, 2000; Johnson, Herter, and Bradstreet, 1987; Johnson and Herter, 1989; Noel and Johnson, 1997; Richardson and Johnson, 1981; Stickney and Ritchie, 1996; Truett, Miller, and Kertell, 1997.
72	Gwyder Bay, West Dock, Cottle and Return Islands	A-2f	May-October	Birds	Birds: geese (BLBR, LSGO, GWFG), eiders (COEI, KIEI), LTDU, scoters (SUSC, WWSC), shorebirds, loons (all 3 species)	Fischer and Larned, 2004; Johnson, 2000; Noel et al., 2005; Noel and Johnson, 1997; Powell et al., 2005; Truett, Miller, and Kertell, 1997; Stickney and Ritchie, 1996; Troy, 2003.
73	Prudhoe Bay	A-2e	May-October	Birds	Birds: geese (BLBR, LSGO, GWFG), eiders (COEI, KIEI), LTDU, scoters (SUSC, WWSC), shorebirds, loons (all 3 species)	Dau and Larned, 2004, 2005; Fischer and Larned, 2004; Johnson and Richardson, 1982; Noel and Johnson, 1997; Noel et al., 2005; Powell et al., 2005; Richardson and Johnson, 1981; Stickney and Ritchie, 1996; Troy, 2003; Truett, Miller, and Kertell, 1997.
76	Kendall Island Bird Sanctuary (Canada)	A-2d	May-October	Birds	Birds: eiders (KIEI, COEI), LTDU, scoters (all 3 species), loons (all 3 species)	Alexander, Dickson, and Westover, 1997; Dickson et al., 1997; Divoky, 1984; Johnson and Richardson, 1982; Richardson and Johnson, 1981.

ERA	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
77	Sagavanirktok River Delta/Foggy Island Bay	A-2f	May-October	Birds	Birds: eiders (SPEI, COE)l, LTDU, scoters (all 3 species), loons (all 3 species)	Dau and Larned, 2004, 2005; Divoky, 1984; Fischer and Larned, 2004; Johnson, 2000; Johnson, Wiggins, and Wainwright, 1993; Troy, 2003.
78	Mikkelsen Bay	A-2f	May-October	Birds	Birds: eiders (KIEI, COEI), LTDU, scoters, loons (PALO, RTLO)	Dau and Larned, 2004, 2005; Divoky, 1984; Fischer and Larned, 2004; Flint et al., 2004; Johnson, 2000; Noel et al., 2005.
79	Demarcation Bay Offshore	A-2d	May-October	Birds	Birds: eiders (KIEI, COEI), LTDU, scoters (SUSC, WWSC), loons, molting LTDU, staging shorebirds	Dau and Larned, 2004, 2005; Fischer and Larned, 2004; Johnson and Richardson, 1982; Johnson and Herter, 1989; Richardson and Johnson, 1981.
81	Simpson Cove	A-2e	May-October	Birds	Birds: COEI, LTDU, PALO, scoters (SUSC, WWSC)	Dau and Larned, 2004, 2005; Fischer and Larned, 2004; Johnson and Herter, 1989.
96	Midway, Cross and Bartlett Islands	A-2e	May-October	Birds, barrier islands	Birds: eiders (SPEI,COEI), LTDU, scoters (all 3 species), loons (all 3 species)	Dau and Larned, 2004, 2005; Divoky, 1984; Fischer and Larned, 2004; Johnson, 2000; Troy, 2003, (Figure 3).
98	Anderson Point Barrier Islands	A-2e	May-October	Birds, barrier islands	Birds: eiders (SPEI,COEI), LTDU, scoters (all 3 species), loons (all 3 species)	Dau and Larned, 2004, 2005; Divoky, 1984; Fischer and Larned, 2004; Johnson, 2000; Troy, 2003, (Figure 3).
99	Arey and Barter Islands, Bernard Spit	A-2e	May-October	Birds, barrier islands	Birds: eiders (SPEI,COEI), LTDU, scoters (all 3 species), loons (all 3 species)	Dau and Larned, 2004, 2005; Divoky, 1984; Fischer and Larned, 2004; Johnson, 2000; Troy, 2003, (Figure 3).
100	Jago and Tapkaurak Spits	A-2e	May-October	Birds, barrier islands	Birds: eiders (SPEI,COEI), LTDU, scoters (all 3 species), loons (all 3 species)	Dau and Larned, 2004, 2005; Divoky, 1984; Fischer and Larned, 2004; Johnson, 2000; Troy, 2003, (Figure 3).

Notes: Yellow-billed Loon (YBLO), Red-throated Loon (RTLO), Pacific Loon (PALO), COEI (Common Eider), KIEI (King Eider), SPEI (Spectacled Eider), STEI (Steller's Eider), LTDU (Long-tailed Duck), Black Scoter (BLSC), Surf Scoter (SUSC), White-winged Scoter (WWSC), Black Brant (BLBR), Greater White-fronted Goose (GWFG), Canada Goose (CANG), Lesser Snow Goose (LSGO): http://www.birdpop.org/DownloadDocuments/Alpha_codes_eng.pdf
Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-11. Environmental Resource Areas Used in the Analysis of Large or Very Large Oil Spill Effects on Whales in Sections 4.3 and 4.4.

ERA ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
1	Kasegaluk Lagoon Area	A-2f	May - October	Birds, Barrier Island, Seals, Whales	Beluga Whales	Suydam et al., 2001; Suydam, Lowry, and Frost, 2005;
13	Kotzebue Sound	A-2a	January-December	Subsistence, Whales	Beluga Whales	Suydam et al., 2001; Suydam, Lowry, and Frost, 2005.
20	East Chukchi Offshore	A-2b	September-October	Whales	Bowhead Whales, Beluga Whales-fall migration, feeding	Clarke et al., 2013, 2014; Fraker, Sergeant, and Hoek, 1978; Harwood and Smith, 2002; Hauser et al., 2014; Ljungblad et al., 1988; Martell, Dickinson, and Casselman, 1984; Melnikov and Bobkov. 1993; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small and Citta. 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002.
21	AK BFT Bowhead FM 1	A-2e	September-October	Whales	Bowhead Whales, Beluga Whales-fall migration	Clarke et al., 2013, 2014; Hauser et al., 2014; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002;
22	AK BFT Bowhead FM 2	A-2e	September-October	Whales	Bowhead Whales-fall migration	Clarke et al., 2013, 2014; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002;
24	AK BFT Bowhead FM 3	A-2e	September-October	Whales	Bowhead Whales-fall migration	Clarke et al., 2013, 2014; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002.
25	AK BFT Bowhead FM 4	A-2e	September-October	Whales	Bowhead Whales-fall migration	Clarke et al., 2013, 2014; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002.
26	AK BFT Bowhead FM 5	A-2e	September-October	Whales	Bowhead Whales-fall migration	Clarke et al., 2013, 2014; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002.

ERA ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
27	AK BFT Bowhead FM 6	A-2e	September-October	Whales	Bowhead Whales-fall migration	Clarke et al., 2013, 2014; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002.
28	AK BFT Bowhead FM 7	A-2e	September-October	Whales	Bowhead Whales-fall migration	Clarke et al., 2013, 2014; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002.
29	AK BFT Bowhead FM 8	A-2e	September-October	Whales	Bowhead Whales-fall migration	Clarke et al., 2013, 2014; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002.
30	Beaufort Spring Lead 1	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales-spring migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
31	Beaufort Spring Lead 2	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales-spring migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
32	Beaufort Spring Lead 3	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales-spring migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
33	Beaufort Spring Lead 4	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales; Spring Migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
34	Beaufort Spring Lead 5	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales-spring migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
35	Beaufort Spring Lead 6	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales-spring migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
36	Beaufort Spring Lead 7	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales-spring migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
37	Beaufort Spring Lead 8	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales-spring migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
45	Beaufort Spring Lead 9	A-2d	April-June	Whales	Bowhead Whales, Beluga Whales-spring migration	Clarke et al., 2013; Ljungblad et al., 1988; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
49	Chukchi Spring Lead 1	A-2a	April-June	Whales	Bowhead Whales, Gray Whales, Beluga Whales – spring migration-spring leads-Chukchi	Bogoslovskaya, Votrogov, and Krupnik,1982; Clarke et al., 2013; Heide, 1979; Doroshenko, and Kolesnikov, 1984; George et al., 2012; Stringer and Groves, 1991; Ljungblad et al., 1986, 1988; Miller, Rugh, and Johnson,1986; Melnikov, Zelensky, and Ainana,1997; Melnikov et al., 2004; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Melnikov and Zeh, 2007.
53	Chukchi Spring Lead 2	A-2f	April-June	Whales	Bowhead Whales, Gray Whales, Beluga Whales – spring migration-spring leads-Chukchi	Bogoslovskaya, Votrogov, and Krupnik,1982; Clarke et al., 2013; Doroshenko, 1979; Doroshenko, and Kolesnikov, 1984; George et al., 2012; Stringer and Groves, 1991; Ljungblad et al., 1986, 1988; Miller, Rugh, and Johnson,1986; Melnikov, Zelensky, and Ainana,1997; Melnikov et al., 2004; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Melnikov, and Zeh, 2007.
54	Chukchi Spring Lead 3	A-2f	April-June	Whales	Bowhead Whales, Gray Whales, Beluga Whales – spring migration-spring leads-Chukchi	Bogoslovskaya, Votrogov, and Krupnik,1982; Clarke et al., 2013; Doroshenko, 1979; Doroshenko, and Kolesnikov, 1984; George et al., 2012; Stringer and Groves, 1991; Ljungblad et al., 1986, 1988; Miller, Rugh, and Johnson,1986; Melnikov, Zelensky, and Ainana,1997; Melnikov et al., 2004; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Melnikov, and Zeh, 2007.
56	Hanna Shoal Area	A-2b	August-October	Whales	Bowhead Whales, historically Gray whales (Hanna Shoal)	Clarke et al., 2013; Ljungblad et al., 1986; Moore, DeMaster and Dayton. 2000; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
60	King Pt.-Shallow Bay	A-2e	July	Whales, Subsistence	Beluga Whales	Harwood et al, 1996; Fraker, Sergeant, and Hoek, 1978; Harwood and Smith, 2002; Harwood et al., 2010; Martell, Dickinson, and Casselman, 1984.
61	Pt Lay –Barrow BH GW SFF	A-2b	July-October	Whales	Bowhead Whales, Gray Whales; summer-fall feeding, Gray and Bowhead Whale cow/calf aggregations and bowhead fall migration	Bogoslovskaya, Votrogov, and Krupnik, 1982; Clarke et al., 2013, 2014; George et al., 2012; Ljungblad et al., 1988; Melnikov and Bobkov, 1993; Melnikov, Zelensky, and Ainana, 1997; Miller, Rugh, and Johnson, 1986; Moore and DeMaster, 1997; Moore et al., 1995; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013.
63	North Chukchi	A-2a	October-December	Whales	Bowhead Whales	Martell, Dickinson, and Casselman, 1984; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.

ERA ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
65	Smith Bay	A-2d	May-October	Whales, Birds, Marine Mammals	Bowhead Whales	
70	North Central Chukchi	A-2a	October-December	Whales	Bowhead Whales	Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
74	Offshore Herald Island	A-2a	October - December	Whales, Polar Bears, Walrus	Bowhead Whales	Bogoslovskaya, Votrogov, and Krupnik,1982; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
82	N Chukotka Nearshore 2	A-2a	July-October	Whales	Bowhead Whales, Gray Whales; summer-fall feeding and bowhead fall migration	Bogoslovskaya, Votrogov, and Krupnik, 1982; George et al., 2012; Heide-Jorgensen et al., 2012; Ljungblad et al., 1988; Melnikov and Bobkov, 1993; Melnikov, Zelensky, and Ainana, 1997; Miller, Rugh, and Johnson, 1986; Moore and DeMaster, 1997; Moore et al., 1995; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
83	N Chukotka Nearshore 3	A-2a	July-December	Whales	Bowhead Whales, Gray Whales; summer-fall feeding and bowhead fall migration	Bogoslovskaya, Votrogov, and Krupnik, 1982; George et al., 2012; Heide-Jorgensen et al., 2012;Ljungblad et al., 1988; Melnikov and Bobkov, 1993; Melnikov, Zelensky, and Ainana, 1997; Miller, Rugh, and Johnson, 1986; Moore and DeMaster, 1997; Moore et al., 1995; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
91	Hope Sea Valley	A-2a	October-December	Whales	Bowhead Whales	Bogoslovskaya, Votrogov, and Krupnik, 1982; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
107	Pt Hope Offshore	A-2f	June-September	Whales	Gray Whales, Fin Whales, Humpback Whales summer fall aggregation	Clarke et al., 2013 (Maps 6, 13); Friday et al., 2014; George et al., 2012; Miller, Johnson, and Doroshenko, 1985.
108	Barrow Feeding Aggregation	A-2b	September-October	Whales	Bowhead Whales, Gray Whales-feeding aggregation- fall	Clarke et al., 2012, 2013; Ljungblad et al., 1988; Monnett and Treacy, 2005; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013; Shelden and Mocklin, 2013;.
109	AK BFT Shelf Edge	A-2d	July, August	Whales	Bowhead Whales-cow/calf and feeding aggregation	Christman et al., 2013; Clarke et al., 2012, 2013.
110	AK BFT Outer Shelf & Slope 1	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
111	AK BFT Outer & Slope 2	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
112	AK BFT Outer & Slope 3	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
113	AK BFT Shelf & Slope 4	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
114	AK BFT Outer Shelf & Slope 5	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
115	AK BFT Outer Shelf & Slope 6	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
116	AK BFT Outer Shelf & Slope 7	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
117	AK BFT Outer Shelf & Slope 8	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
118	AK BFT Outer Shelf & Slope 9	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
119	AK BFT Outer Shelf & Slope 10	A-2e	July-October	Whales	Beluga Whales –summer- fall feeding concentration and movement corridor	Clarke et al., 2013, 2014; Richard, Martin and Orr, 1998, 2001.
120	Rus CH GW Fall 1	A-2e	September-October	Whales	Gray Whales-fall feeding aggregation	Bogoslovskaya, Votrogov, and Krupnik, 1982; Doroshenko and Kolesnikov, 1983; George et al., 2012; Miller, Johnson, and Doroshenko, 1985.
121	Cape Lisburne – Pt Hope	A-2e	June-September	Whales	Gray Whale-cow/calf aggregation	Ljungblad et al., 1988.
122	North Chukotka Offshore	A-2a	October-December	Whales	Bowhead Whale- fall migration	Bogoslovskaya, Votrogov, and Krupnik, 1982; George et al., 2012; Ljungblad et al., 1986; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.

ERA ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
123	AK Chukchi Offshore	A-2a	October-December	Whales	Bowhead Whale- fall migration	Ainana, Zelenski, and Bychkov, 2001; Bogoslovskaya, Votrogov, and Krupnik, 1982; Melnikov, V. V. 2000; Melnikov and Bobkov, 1993; Melnikov, Zelensky, and Ainana, 1997; Miller, Rugh, and Johnson, 1986; Mizroch, Rice, and Breiwick, 1984; Mizroch et al., 2009; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
124	Central Chukchi Offshore	A-2b	October-December	Whales	Bowhead Whale- fall migration	Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
BSs						
39 - 40	Amundsen Gulf BH Spring	A-1	May-July	Whales	Bowhead Whale-spring aggregation	Braham, Fraker, and Krogman, 1980; Fraker, Sergeant, and Hoek, 1978; Harwood and Smith, 2002; Martell, Dickinson, and Casselman, 1984; Quakenbush and Citta, 2013; Quakenbush, Small, and Citta, 2013.
2	RusCh C Dezhnev	A-1	May-October	Whales	Gray Whales, Beluga Whales, Humpback Whales, Bowhead Whales	Clarke et al., 2013 (Maps 6, 13); George et al., 2012; Miller, Johnson, and Doroshenko, 1985.

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-12. Environmental Resource Areas Used in the Analysis of Large or Very Large Oil Spill Effects on Subsistence Resources in Sections 4.3 and 4.4.

ERA ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
3	SUA: Uelen/Russia	A-2a	September-October	Subsistence	Bowhead Whales, Grey Whales, Walrus	Melnikov and Bobkov, 1993; Ainana, Zelensky, and Bychkov, 2001.
4	SUA:Naukan/Russia	A-2a	January-December	Subsistence	Bowhead Whales, Grey Whales, Walrus	Melnikov and Bobkov, 1993; Ainana, Zelensky, and Bychkov, 2001.
5	SUA: Shishmaref, North	A-2a	March-October	Subsistence, Marine Mammals	Polar Bears, Walrus, Seals	Sobelman, 1985; Wisniewski, 2005.
12	SUA: Nuiqsut-Colville Delta	A-2d	April-October	Subsistence	Whales, Seals, Waterfowl, Ocean fish, Moose, Caribou	Galganaitis, 2009; 2014; S.R. Braund and Assocs, 2010; USDOI, BLM and MMS, 2003; USDOI, MMS, 1984.
13	Kotzebue Sound	A-2a	January-December	Subsistence, Whales	Polar Bears, Walrus, Seals, Bowhead Whales, Beluga Whales	Burch, 1985.
38	SUA: Pt. Hope- Cape Lisburne	A-2f	January-December	Subsistence	Beluga Whales, Bowhead Whales, Walrus, Seals	Braund and Burnham, 1984.
39	SUA: Pt. Lay- Kasegaluk	A-2e	January-December	Subsistence	Fish, Seals, Waterfowl, Beluga Whales	Braund and Burnham, 1984;Galginaitis and Impact Assessment, 1989; Huntington and Mymrin, 1996; S.R. Braund and Assocs, 2013 Maps 64-103; USDOI, BLM and MMS, 2003.
40	SUA: Icy Cape-Wainwright	A-2a	January-December	Subsistence	Bowhead Whales, Beluga Whales	Braund and Burnham, 1984; Kassam and Wainwright Traditional Council, 2001; USDOI, BLM and USDOI, MMS, 2003; S.R. Braund and Assocs. and University of Alaska Anchorage, ISER, 1993a; S.R. Braund and Assocs, 2013 Maps 4-26.
41	SUA: Barrow- Chukchi	A-2e	April-May	Subsistence	Bowhead Whales, Beluga Whales, Walrus, Waterfowl, Seals, Ocean Fish	Braund and Burnham, 1984; Pedersen, 1979; S.R. Braund and Assocs, 2010; S.R. Braund and Assocs. and University of Alaska Anchorage, ISER, 1993b; USDOI, BLM and USDOI, MMS, 2003.
42	SUA: Barrow - East Arch	A-2f	August-October	Subsistence	Bowhead Whales, Beluga Whales, Walrus, Waterfowl, Seals, Ocean Fish	Braund and Burnham, 1984; Pedersen, 1979; S.R. Braund and Assocs, 2010; S.R. Braund and Assocs. and University of Alaska Anchorage, ISER, 1993b; USDOI, BLM and USDOI, MMS, 2003.
43	SUA: Nuiqsut- Cross Island	A-2d	August-October	Subsistence	Bowhead Whales, Seals, Waterfowl, Ocean Fish	Galganitis, 2009; Galganitis, 2014;Impact Assessment, 1990a; S.R Braund and Assocs., 2010
44	SUA: Kaktovik	A-2d	August-October	Subsistence	Bowhead Whales, Seals, Walrus, Beluga Whales, Waterfowl, Ocean Fish	Impact Assessment, 1990b; North Slope Borough, 2001; S.R. Braund and Assocs, 2010.
60	SUA: King Pt./Shallow Bay	A-2e	April-September	Subsistence, Whales	Polar Bears, Seals, Fish, Bowhead Whales, Beluga Whales	Environment Canada, 2000.
90	SUA: Gary & Kendall Is./Canada	A-2e	July-August	Subsistence	Beluga Whales	Environment Canada, 2000.
97	SUA: Tigvariak Island	A-2e	May-October	Subsistence	Traditional Whaling Area	Pedersen, 1979; S.R. Braund and Assocs., 2010.

USDOI, BOEM, Alaska OCS Region (2014). Notes: SUA=Subsistence Use Area; 1. ERA 5 Vulnerability March-October conservative estimate for April-October.

Table A.1-13. Environmental Resource Areas, Grouped Land Segments and Land Segments Used in the Analysis of Large or Very Large Oil Spill Effects on Marine Mammals (Polar Bears and Walrus) in Sections 4.3 and 4.4.

ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
ERAs						
11	Wrangel Island 12 nmi & Offshore	A-2a	July - November	Marine Mammals	Polar Bears, Walrus	Fay, 1982; Kochnev, 2004; Kochnev, 2006.
15	Cape Lisburne Seabird Colony Area	A-2b	May-October	Marine Mammals	Walrus	Fay, 1982.
23	Polar Bear Offshore	A-2a	November-June	Marine Mammals	Polar Bears	USFWS, 2013b.
47	Hanna Shoal Walrus Use Area	A-2e	May-October	Marine Mammals	Walrus	Jay, Fischbach, and Kochnev, 2012, Figures 4 & 5, pp. 8-9.
50	Pt Lay Walrus Offshore	A-2f	May-October	Marine Mammals	Walrus	Jay, Fischbach, and Kochnev, 2012, Figures 4 & 5, pp. 8-9.
51	Pt Lay Walrus Nearshore	A-2a	May-October	Marine Mammals	Walrus	Jay, Fischbach, and Kochnev, 2012, Figures 4 & 5, pp. 8-9.
52	Russian coast Offshore Tagging data	A-2b	May-November	Marine Mammals	Walrus	Jay, Fischbach, and Kochnev, 2012, Figures 4 & 5, pp. 8-9.
55	Point Barrow, Plover Islands	A-2e	January-December	Marine Mammals	Polar Bears	Kalxdorff et al., 2002.
58	Russian Coast nearshore Tagging data	A-2b	May-November	Marine Mammals	Walrus	Jay, Fischbach, and Kochnev, 2012, Figures 4 & 5, pp. 8-9.
59	Ostrov Kolyuchin	A-2b	July -November	Marine Mammals	Polar Bears, Walrus	Fay, 1982; Kochnev, 2006; Kochnev et al., 2003.
66	Herald Island	A-2a	July-November	Marine Mammals	Polar Bears, Walrus	Fay, 1982; Ovsyanikov,1998; Stishov, 1991.
92	Thetis, Jones, Cottle & Return Isl.	A-2e	January-December	Marine Mammals	Polar Bears (den)	Kalxdorff et al., 2002.
93	Cross and No Name Island	A-2f	January-December	Marine Mammals	Polar Bears	Miller, Schliebe, and Proffitt, 2006.
94	Maguire, Flaxman & Barrier Isl.	A-2e	January-December	Marine Mammals	Polar Bears (den)	Kalxdorff et al., 2002.
95	Arey & Barter Island, Bernard Spit	A-2f	January-December	Marine Mammals	Polar Bears	Miller, Schliebe, and Proffitt, 2006.
LSs						
28	Ostrov Karkarpko, Mys Vankarem,	A-2a	January-December	Marine Mammals	Walrus, July-November	Fay, 1982.; Kochnev, 2004.
29	Mys Onmyn,	A-2a	January-December	Marine Mammals	Walrus, July-November	Fay, 1982; Kochnev, 2004.
38	Mys Unikin,	A-2a	January-December	Marine Mammals	Walrus, July-November	Fay, 1982; Kochnev, 2004.
39	Mys Dezhnev, Mys Peek, Cape Peek	A-2a	January-December	Marine Mammals	Walrus, July-November	Fay, 1982; Kochnev, 2004.
85	Barrow, Browerville, Elson Lagoon	A-2b	January-December	Marine Mammals	Polar Bears, August-November	Kalxdorff et al., 2002.
GLSs						
133	Mys Blossom	A-4c	July-November	Marine Mammals	Walrus	Fay, 1982; Ovsyanikov, 2003; Kochnev, 2004; Kochnev, 2006.
134	Bukhta Somnitel'naya	A-4c	July-November	Marine Mammals	Polar Bears, Walrus	Fay, 1982; Ovsyanikov, 2003; Kochnev, 2004; Kochnev, 2006.
136	Ostrov Idlidlya	A-4c	July-November	Marine Mammals	Walrus	Fay, 1982; Kochnev, 2004.
137	Mys Serditse Kamen	A-4c	July-November	Marine Mammals	Walrus	Fay, 1982; Kochnev, 2004.
138	Chukotka Coast Haulout	A-4c	July-November	Marine Mammals	Walrus	Jay, Fischbach, and Kochnev, 2012, Figures 4 & 5, pp. 8-9.
145	Cape Lisburne	A-4b	August-November	Marine Mammals	Walrus	Fay, 1982.
147	Point Lay Haulout	A-4a	July-November	Marine Mammals	Walrus	Fischbach, Monson, and Jay, 2009.
157	96 -115 Summer	A-4a	June - August	Marine Mammals	Polar Bears	Derocher et al, 2013, (Figure 13, p. 59).
159	99-115 Fall	A-4b	September-November	Marine Mammals	Polar Bears	Derocher et al, 2013, (Figure 13, p. 59).
160	102-110 Winter	A-4b	December-February	Marine Mammals	Polar Bears	Derocher et al, 2013, (Figure 13, p. 59).
166	112-119 Spring	A-4b	March - May	Marine Mammals	Polar Bears	Derocher et al, 2013, (Figure 13, p. 59).
167	112-121 Winter	A-4a	December-February	Marine Mammals	Polar Bears	Derocher et al, 2013, (Figure 13, p. 59).
170	122-132 Spring	A-4a	March - May	Marine Mammals	Polar Bears	Derocher et al, 2013, (Figure 13, p. 59).
171	122-132 Winter	A-4a	December-February	Marine Mammals	Polar Bears	Derocher et al, 2013, (Figure 13, p. 59).
174	Russia Chukchi Coast Marine Mammals	A-4c	July-November	Marine Mammals	Polar Bears, Walrus	Kochnev, 2006.

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-14. Environmental Resource Areas, Grouped Land Segments and Land Segments Used in the Analysis of Large or Very Large Oil Spill Effects on Marine Mammals (Ice Seals) in Sections 4.3 and 4.4.

ERA ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
1	Kasegaluk Lagoon Area	A-2f	May- October	Marine Mammals	Spotted Seals	ADF&G, 2001; Boveng et al., 2009.
5	SUA: Shismaref, North	A-2a	April-October[1]	Marine Mammals	Spotted Seals	ADF&G, 2001; Boveng et al., 2009.
46	Wrangel Island 12 nmi Buffer 2	A-2a	December-May	Marine Mammals	Bearded Seals Ringed Seals	Cameron et al., 2010; Kelly et al., 2010.
48	Chukchi Lead System 4	A-2c	December-May	Marine Mammals	Bearded Seals Ringed Seals	Cameron et al., 2010; Kelly et al., 2010.
62	Herald Shoal Polynya 2	A-2a	December-May	Marine Mammals	Ringed Seals Bearded Seals	Cameron et al., 2010; Kelly et al., 2010.
64	Peard Bay Area/Franklin Spit Area	A-2f	May-October	Marine Mammals	Spotted Seals	ADF&G, 2001; Boveng et al., 2009.

ERA ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
65	Smith Bay: Spotted Seal Haulout	A-2d	May-October	Marine Mammals	Spotted Seals	ADF&G, 2001; Boveng et al., 2009.
68	Harrison Bay	A-2e	May-October	Marine Mammals	Spotted seals	ADF&G, 2001; Boveng et al., 2009.
69	Harrison Bay/Colville Delta	A-2f	May-October	Marine Mammals	Spotted Seals	ADF&G, 2001; Boveng et al., 2009.
104	Kotzebue Sound	A-2a	January-December[2]	Marine Mammals	*Spotted Seals+Ringed Seals	ADF&G, 2001; Boveng et al., 2009; Kelly et al., 2010.
GLS ID						
135	Kolyuchin Bay	A-4c	June-November	Marine Mammals	Spotted Seal Ringed Seals	Kelly et al., 2010; Boveng et al., 2009; Heptner et al., 1996.
153	Smith Bay Spotted Seal Haulout	A-4b	May-October	Marine Mammals	Spotted Seals	ADF&G, 2001; Boveng et al., 2009.
155	Harrison Bay Spotted Seal Haulout	A-4b	June- September	Marine Mammals	Spotted Seals	ADF&G, 2001; Boveng et al., 2009.

Source: USDOI, BOEM, Alaska OCS Region (2014). Notes: 1. ERA 5 April– October was used as a conservative estimate for a vulnerability period May-October. 2. ERA 104 January - December was used as conservative vulnerability for March to October.

Table A.1-15. Environmental Resource Areas and Land Segments Used in the Analysis of Large or Very Large Oil Spill Effects on Fish in Sections 4.3 and 4.4.

ERA GLS or LS ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
ERAs Marine Waters						
84	Canning River Delta	A-2d	January - December	Anadromous and Marine Nearshore Fish	Pp, DVpr, CHp, Wp, Arctic cod, capelin, Arctic cisco, stickleback, sculpin spp.	Jarvela and Thorsteinson, 1998; Johnson and Daigneault, 2013.
85	Sagavanirktok River Delta	A-2e	January - December	Anadromous and Marine Nearshore Fish	CHp, Pp, DVpr, Wp Arctic char, Arctic cod, capelin, Arctic cisco, stickleback, sculpin spp.	Craig, 1984; Jarvela and Thorsteinson, 1998; Johnson and Daigneault, 2013.
86	Harrison Bay	A-2f	January - December	Marine Fish – nearshore	Arctic cod, Capelin, OM, Saffron cod, Fourhorn sculpin, Wp	Craig, 1984; Jarvela and Thorsteinson, 1998; Johnson and Daigneault, 2013.
87	Colville River Delta	A-2e	January - December	Anadromous and Marine Nearshore Fish	CHp, Pp, DVp, Wp, Arctic cod, Capelin, OM, Saffron cod, Fourhorn sculpin, Arctic cisco, Arctic char	Craig, 1984; Jarvela and Thorsteinson, 1998; Johnson and Daigneault, 2013; MBC Applied Environmental Sciences, 2004.
88	Simpson Lagoon	A-2f	January-December	Marine Fish – nearshore	Arctic cod, Capelin, OM, Saffron cod, Fourhorn sculpin, Wp, Arctic char	Craig, 1984; Jarvela and Thorsteinson, 1998; Johnson and Daigneault, 2013.
89	Mackenzie River Delta	A-2e	January - December	Anadromous and Marine Nearshore Fish	CHp, OMp, Wp, Sheefish, Saffron cod, Arctic cod, Arctic char, Arctic Cisco, Pacific herring, prickleback spp., sculpin spp.	Craig, 1984; MBC Applied Environmental Sciences, 2004; Sawatzky et.al, 2007; Wong et al., 2013.
102	Opilio Crab EFH	A-2b	January-December	Opilio Crab Habitat (EFH)	Opilio Crab	NMFS, 2009; NMFS, 2009.
103	Saffron Cod EFH	A-2e	January-December	Saffron Cod Habitat (EFH)	Saffron Cod	NMFS, 2009; NMFS, 2009.
104	Kotzebue Sound	A-2a	January-December	Anadromous and Marine Nearshore Fish	CHp, Pp, Kp, Sp, COp, DVp , Wp, OM, Saffron cod, herring, sheefish	Johnson and Daigneault, 2013; Magdanz et al., 2010; NMFS, 2009; Savereide, 2002.
105	Fish Creek	A-2e	January-December	Anadromous Fish	CHp, Kp, Pp,DVp, HWp, Wp	Johnson and Daigneault, 2013.
106	Shaviovik River	A-2d	January-December	Anadromous and Marine Nearshore Fish	Ps, DVp, Arctic char, Arctic cod, capelin, Arctic cisco, stickleback, sculpin spp.	Craig and Poulin, 1975; Jarvela and Thorsteinson, 1998; Johnson and Daigneault, 2013.
GLSs Marine Waters						
140	Noatak River	A-4c	January-December	Anadromous and Marine Nearshore Fish	CHs,Kp,Pp,COp,Sp,DVp, Wp, SF	Johnson and Daigneault, 2013.
141	Cape Krusenstern	A-4a	January-December	Anadromous and Marine Nearshore Fish	CHp.Sp,Pp,COp,Sp,DVp,Wp	Johnson and Daigneault, 2013.
142	Wulik and Kivalina Rivers	A-4a	January-December	Anadromous and Marine Nearshore Fish	CHs,COp,Ks,Pp,Ss,DVs,Wp	Johnson and Daigneault, 2013.
151	KuK River	A-4b	January-December	Anadromous and Marine Nearshore Fish	CHp,Pp,BWp,LCp, OMp	Johnson and Daigneault, 2013.
161	Arctic National Wildlife Refuge	A.-4c	January-December	Anadromous and Marine Nearshore Fish	CHp,Pp,DVr,Wp,Kp,COp,OMp, Arctic char, least cisco, herring, capelin, Arctic cod, saffron cod, sculpin species, eelpout species, Arctic flounder, starry flounder, sand lance	Johnson and Daigneault ADFG), 2013; U.S. Fish and Wildlife Service, 2013.
LSs Russia						
25	Amguema River	A-3a	May - October	Anadromous Fish	CHs, Ps, ALp, DVs, ACs, Kp, Sp, COp, Ws, OMp	Andreev, 2001.
31	Kolyuchinskaya Bay	A-3a	May - October	Anadromous Fish	Ps, Ks, DVs, ACs, Wp, OMp	Andreev, 2001.

ERA GLS or LS ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
37	Chegitun River	A-3a	May - October	Anadromous Fish	Bering Cisco, ACs, DVs, Ps, Ks, CHs, Ss, OMp	Andreev, 2001.
38	Inchoun Lagoon	A-3a	May - October	Anadromous Fish	CHp, Pp, Kp, COp, Sp, Bering Cisco, Least Cisco	Andreev, 2001.
39	Uelen Lagoon	A-3a	May - October	Anadromous Fish	CHp, Pp, Kp, COp, Sp, Bering Cisco, Least Cisco	Andreev, 2001.
LSs United States						
40	Mint River	A-3b	May - October	Anadromous Fish	CHs, Ps, Sp, DVpr	Johnson and Daigneault, 2013.
41	Pinguk River	A-3b	May - October	Anadromous Fish	CHs, Pp, DVp, Wp	Johnson and Daigneault, 2013.
42	Upkuarok Creek, Nuluk River, Kugrupaga River, Trout Creek	A-3b	May - October	Anadromous Fish	DVpr, CHs, Ps, DVp, Wp, DVp, DVpr, Wp	Johnson and Daigneault, 2013.
43	Shishmaref Airport	A-3b	May - October	Anadromous Fish	DVp	Johnson and Daigneault, 2013.
44	Shishmaref Inlet Arctic River, Sanaguich River, Serpentine River	A-3b	May - October	Anadromous Fish	DVp, SFp, Wp, DVp, SFp, Wp, DVp, CHp, DVp, SFp, Wp	Johnson and Daigneault, 2013.
47	Kitluk River	A-3b	May - October	Anadromous Fish	Pp	Johnson and Daigneault, 2013.
49	Kougachuk Creek	A-3b	May - October	Anadromous Fish	Pp	Johnson and Daigneault, 2013.
51	Inmachuk River, Kugruk River	A-3b	May - October	Anadromous Fish	CHs, Ps, DVp, CHp, Pp, DVp	Johnson and Daigneault, 2013.
53	Kiwalik River, Buckland River	A-3b	May - October	Anadromous Fish	CHp, Pp, DVp, CHp, COp, Kp, Pp, DVp, Wp	Johnson and Daigneault, 2013.
54	Baldwin Penn Kobuk River, & Channels	A-3b	May - October	Anadromous Fish	DVp, DVs, CHp, Kp, Pp, DVs, SFp, Wp	Johnson and Daigneault, 2013.
55	Hotham Inlet Ogriveg River	A-3b	May - October	Anadromous Fish	CHp, Pp, DVs, Wp CHp, Pp, DVp	Johnson and Daigneault, 2013.
56	Noatak River	A-3b	May - October	Anadromous Fish	CHp, COp, Kp, Pp, Sp, DVp, SFp, Wpr	Johnson and Daigneault, 2013.
57	Aukulak Lagoon	A-3b	May - October	Anadromous Fish	Wp	Johnson and Daigneault, 2013.
58	Tasaychek Lagoon	A-3b	May - October	Anadromous Fish	Pp	Johnson and Daigneault, 2013.
59	Kiligmak Inlet Jade Creek, Rabbit Creek, Imik Lagoon New Heart Creek, Omikviorok River	A-3b	May - October	Anadromous Fish	DVp, Wp DVp CHp, Sp, DVp Wp DVr DVp, Wp	Johnson and Daigneault, 2013.
60	Imikruk Lagoon Wulik River, Kivalina River	A-3b	May - October	Anadromous Fish	Wp, CHp, COp, Kp, Pp, Sp, DVs, Wp CHp, CHs, Pp, DVp	Johnson and Daigneault, 2013.
64	Sulupoaktak Chnl	A-3b	May - October	Anadromous Fish	Pp, DVp	Johnson and Daigneault, 2013.
67	Pitmegea River	A-3b	May - October	Anadromous Fish	CHp, Pp, DVp	Johnson and Daigneault, 2013.
70	Kuchiak Creek	A-3b	May - October	Anadromous Fish	CHs, COs	Johnson and Daigneault, 2013.
71	Kukpowruk River	A-3b	May - October	Anadromous Fish	CHp, Pp, DVp	Johnson and Daigneault, 2013.
72	Pt Lay, Kokolik River	A-3b	June - October	Anadromous Fish	CHp, Pp, DVp	Johnson and Daigneault, 2013.
74	Utukok River	A-3b	June - October	Anadromous Fish	CHp, Pp, DVp	Johnson and Daigneault, 2013.
80	Kugrua River	A-3b	June - October	Anadromous Fish	CHs,Ps	Johnson and Daigneault, 2013.
87	Inaru River, Meade River, Topagoruk River, Chipp River	A-3c	June - October	Anadromous Fish	Wsr CHs,Wp Wsr Ps,Wsr	Johnson and Daigneault, 2013.
89	Ikpikpuk River	A-3c	June - October	Anadromous Fish	Psr,Wsr	Johnson and Daigneault, 2013.
91	Smith River	A-3c	June - October	Anadromous Fish	DVp,Wp	Johnson and Daigneault, 2013.
93	Kalikpik River	A-3c	June - October	Anadromous Fish	Wp	Johnson and Daigneault, 2013.
94	Fish Creek, Nechelik Channel	A-3c	June - October	Anadromous Fish	CHp,Kp,Pp,DVp,Wp Wp	Johnson and Daigneault, 2013
95	Colville River & Delta	A-3c	June - October	Anadromous Fish	CHp,Pp,DVp,Wp	Johnson and Daigneault, 2013.
96	Kalubik River, Ugnuravik River	A-3c	June - October	Anadromous Fish	DVp,Wp Wr	Johnson and Daigneault, 2013.
97	Oogrukpuk River, Sakonowyak River	A-3c	June - October	Anadromous Fish	Wpr Wr	Johnson and Daigneault, 2013.
98	Kuparuk River, Fawn Creek, Unnamed 10435 Putuligayuk River	A-3c	June - October	Anadromous Fish	Wr Wp DVr DVr,OMp,Wr	Johnson and Daigneault, 2013.

ERA GLS or LS ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
99	Sagavanirktok River, E. Sagavanirktok Creek	A-3c	June - October	Anadromous Fish	ACp,Chp,Pp,DVr,Wp DVr	Johnson and Daigneault, 2013.
100	Kadleroshilik River, Shaviovik River, 10300	A-3c	June - October	Anadromous Fish	DVr DVp DVr	Johnson and Daigneault, 2013.
101	E Badami Creek, 10280 (AWC#)	A-3c	June - October	Anadromous Fish	DVr DVr	Johnson and Daigneault, 2013.
102	10246 (AWC#) 10238 (AWC#) 10234 (AWC#) Staines River	A-3c	June - October	Anadromous Fish	DVr DVr DVr Pp,DVp,Wp	Johnson and Daigneault, 2013.
103	W. Canning River, Canning River, Tamayariak River	A-3c	June - October	Anadromous Fish	Pp,DVp,Wp CHp,Pp,DVp,Wp DVr	Johnson and Daigneault, 2013.
104	Katakturik River, 10193 (AWC#)	A-3c	June - October	Anadromous Fish	DVp DVr	Johnson and Daigneault, 2013.
105	Marsh Creek, Carter Creek	A-3c	June - October	Anadromous Fish	DVr DVr	Johnson and Daigneault, 2013.
106	ERA 44, 83 (193) Nataroarok Creek, Hulahula River, Okpilak River, 10173 (AWC#)	A-3c	June - October	Anadromous Fish	DVr DVp DVp DVr	Johnson and Daigneault, 2013.
107	Jago River	A-3c	June - October	Anadromous Fish	DVp	Johnson and Daigneault, 2013.
108	Kimikpaurauk River	A-3c	June - October	Anadromous Fish	DVr	Johnson and Daigneault, 2013.
109	Siksik River, Sikrelurak River, Angun River, 10150-2004 (AWC#) Kogotpak 10140-2006 (AWC#)	A-3c	June - October	Anadromous Fish	DVr DVr DVr DVr DVp DVr	Johnson and Daigneault, 2013.
110	Aichilik River, Egaksrak River, Kongakut River	A-3c	June – October	Anadromous Fish	DVp DVp DVp	Johnson and Daigneault, 2013.
LSs Canada						
112	Fish River	A-3c	June - October	Anadromous Fish	ACp, Wp	Craig, 1984; Kendel et al., 1974.
113	Malcolm River	A-3c	June - October	Anadromous Fish	ACp, OMp	Craig, 1984.
114	Firth River	A-3c	June - October	Anadromous Fish	ACp,OMp	Craig, 1984.
116	Spring River	A-3c	June - October	Anadromous Fish	ACp, Wp, SFp, OMp, sculpin spp.	Craig, 1984; Majewski et al, 2013.
117	Babbage River	A-3c	June - October	Anadromous Fish	ACp, Wp	Craig, 1984.
119	Blow River	A-3c	June - October	Anadromous Fish	ACp, Wp, SFp	Craig, 1984.
122-126	Mackenzie River	A-3c	June - October	Anadromous Fish	ACp, Wp, CHp, OMp, SFp	Craig, 1984.
129-132	Kugmallit Bay Tuktoyaktuk Peninsula	A-3c	June - October	Anadromous and Marine Nearshore Fish	AC, DV, OM, Arctic cisco, Least Cisco, Whitefish spp., Arctic cod, Saffron cod, Pacific herring, Arctic flounder, Starry flounder, Sculpin spp.	Niemi, et al., 2012

Key:

AC	Arctic Char	**DV**	Dolly Varden	**W**	Whitefish (undifferentiated)
AL	Arctic lamprey	**P**	Pink salmon	**s**	spawning
K	Chinook salmon	**OM**	Rainbow smelt	**p**	present
CH	Chum salmon	**S**	Sockeye salmon	**r**	rearing
CO	Coho salmon	**SF**	Sheefish		

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-16. Environmental Resource Areas Used in the Analysis of Large or Very Large Oil Spill Effects on Lower Trophic Level Organisms in Sections 4.3 and 4.4.

ERA ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
6	Hanna Shoal	A-2a	January-December	Lower Trophic Level Organisms	Invertebrates	Grebemier, 2012; Moore and Grebmeier, 2013
7	Krill Trap	A-2d	May-October	Lower Trophic Level Organisms	Invertebrates	Ashijan et al., 2010 (Figures 8 and 14, pp.187–189); Okkonen et al., 2011
16	Barrow Canyon	A-2d	January-December	Lower Trophic Level Organisms	Invertebrates	Moore and Grebmeier, 2013
57	Skull Cliffs	A-2e	January-December	Lower Trophic Level Organisms	Kelp/Invertebrates	Phillips et al., 1984. (pp. 13-14 and 16-19).
75	Boulder Patch Area	A-2f	January-December	Lower Trophic Level Organisms	Kelp/Invertebrates	Dunton and Schonberg, 2000 (p. 383, Fig 4. pp.388-392, Table 5. p. 393, Figure 6); Dunton et.al., 2009 (p. 17, Figure 1.3. p. 27, Table 2.1).
80	Beaufort Outer Shelf 1	A-2d	January-December	Lower Trophic Level Organisms	Invertebrates	Norcross, 2013 (Ongoing and unpublished Canada/USA Transboundary survey quarterly/annual reports); Norcross and Edenfield, 2013 (Ongoing and unpublished Canada/USA Transboundary survey quarterly/annual reports).
101	Beaufort Outer Shelf 2	A-2d	January-December	Lower Trophic Level Organisms	Invertebrates	Norcross, 2013 ; Norcross and Edenfield, 2013

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-17. Grouped Land Segments Used in the Analysis of Large or Very Large Oil Spill Effects on Terrestrial Mammals in Sections 4.3 and 4.4.

GLS ID	Name	Map	Vulnerable	General Resource	Specific Resource	Reference
143	WAH Insect Relief	A.1-4c	July - August	Terrestrial Mammals	Caribou	Person et al., 2007; ADF&G, 2001
146	Ledyard Brown Bears	A.1-4b	June-October	Terrestrial Mammals	Brown Bears	ADF&G, 1986; ADF&G, 2001
148	Kasegaluk Brown Bears	A.1-4b	June-October	Terrestrial Mammals	Brown Bears	ADF&G, 1986; ADF&G, 2001
152	TCH Insect Relief/Calving	A.1-4b	May - August	Terrestrial Mammals	Caribou	ADF&G, 1986; ADF&G, 2001; Carroll et al., 2011; Person et al., 2007;
156	CAH Insect Relief/Calving	A.1-4b	May - August	Terrestrial Mammals	Caribou	ADF&G, 1986; ADF&G, 2001; Arthur and Del Vecchio, 2009; Cameron et al., 2002; Cameron et al., 2005;; Lawhead and Prichard, 2007; Wolfe, 2000
158	Beaufort Muskox	A.1-4b	November-May	Terrestrial Mammals	Muskox	Environment Yukon, 2009; Lawhead and Prichard, 2007; Reynolds, Wilson, and Klein, 2002 ; ADF&G, 2001
162	PCH Insect Relief	A.1-4b	July - August	Terrestrial Mammals	Caribou	Environment Yukon, 2009; Nixon and Russell, 1990; ADF&G, 2001
163	PCH Calving	A.1-4a	May-June	Terrestrial Mammals	Caribou	Fancy et al., 1989; Griffith et al., 2002; Environment Yukon, 2009 ; ADF&G, 2001
164	Yukon Muskox Wintering	A.1-4a	November-April	Terrestrial Mammals	Muskox	Environment Yukon, 2009
168	Yukon Moose	A.1-4b	January-December	Terrestrial Mammals	Caribou	Environment Yukon, 2009
173	Tuktoyaktuk & Cape Bathurst Caribou Insect Relief	A.1-4c	July - August	Terrestrial Mammals	Caribou	Nagy et al., 2005; Gunn, Russell, and Eamer, 2011

Source: USDOI, BOEM, Alaska OCS Region (2014).
Notes: CAH–Central Arctic Herd; PCH–Porcupine Caribou Herd ; TCH–Teshekpuk Caribou Herd ; WAH–Western Arctic Herd

Table A.1-18. Land Segment ID and the Geographic Place Names within the Land Segment.

ID	Geographic Place Names	ID	Geographic Place Names
1	Mys Blossom, Mys Fomy, Khishchnikov, Neozhidannaya, Laguna Vaygan	47	Kitluk River, Northwest Corner Light, West Fork Espenberg River
2	Mys Gil'der, Ushakovskiy, Mys Zapadnyy	48	Cape Espenberg, Espenberg, Espenberg River
3	Mys Florens, Gusinaya	49	Kungealoruk Creek, Kougachuk Creek, Pish River
4	Mys Ushakova, Laguna Drem-Khed	50	Clifford Point, Cripple River, Goodhope Bay, Goodhope River, Rex Point, Sullivan Bluffs
5	Mys Evans, Neizvestnaya, Bukhta Pestsonaya	51	Cape Deceit, Deering, Kugruk Lagoon, Kugruk River, Sullivan Lake, Toawlevic Point
6	Ostrov Mushtakova	52	Motherwood Point, Ninemile Point, Willow Bay
7	Kosa Bruch	53	Kiwalik, Kiwalik Lagoon, Middle Channel Kiwalk River, Minnehaha Creek, Mud Channel Creek, Mud Creek
8	Klark, Mys Litke, Mys Pillar, Skeletov, Mys Uering	54	Baldwin Peninsula, Lewis Rich Channel
9	Nasha, Mys Proletarskiy, Bukhta Rodzhers	55	Cape Blossom, Pipe Spit
10	Reka Berri, Bukhta Davidova, , Khishchnika, Reka Khishchniki	56	Kinuk Island, Kotzebue, Noatak River
11	Bukhta Somnitel'naya	57	Aukulak Lagoon, Igisukruk Mountain, Noak, Mount, Sheshalik, Sheshalik Spit
12	Zaliv Krasika, Mamontovaya, Bukhta Predatel'skaya	58	Cape Krusenstern, Eigaloruk, Evelukpalik River, Kasik Lagoon, Krusenstern Lagoon,
13	Mys Kanayen, Mys Kekurnyy, Mys Shalaurova, Veyeman	59	Imik Lagoon, Ipiavik Lagoon, Kotlik Lagoon, Omikviorok River
14	Innukay, Laguna Innukay, Umkuveyem, Mys Veuman	60	Imikruk Lagoon, Imnakuk Bluff, Kivalina, Kivalina Lagoon, Singigrak Spit, Kivalina River, Wulik River
15	Laguna Adtaynung, Mys Billingsa, Ettam, Gytkhelen, Laguna Uvargina	61	Asikpak Lagoon,Cape Seppings,Kavrorak Lagoon,Pusaluk Lagoon,Seppings Lagoon
16	Mys Emmatagen, Mys Enmytagyn, Uvargin	62	Atosik Lagoon,Chariot,Ikaknak Pond,Kisimilok Mountain,Kuropak Creek,Mad Hill
17	Enmaat'khyr, Kenmankautir, Mys Olennyy, Mys Yakan, Yakanvaam, Yakan	63	Akoviknak Lagoon, Cape Thompson, Crowbill Point, Igilerak Hill, Kemegrak Lagoon
18	Mys Enmykay, Laguna Olennaya, Pil'khikay, Ren, Rovaam, Laguna Rypil'khin	64	Aiautak Lagoon, Ipiutak Lagoon, Kowtuk Point, Kukpuk River, Pingu Bluff, Point Hope, Sinigrok Point, Sinuk
19	Laguna Kuepil'khin, Leningradskiy	65	Buckland, Cape Dyer, Cape Lewis, Cape Lisburne
20	Polyarnyy, Kuekvun', Notakatryn, Pil'gyn, Tynupytku	66	Ayugatak Lagoon
21	Laguna Kinmanyakicha, Laguna Pil'khikay, Amen, Pil'khikay, Bukhta Severnaya, Val'korkey	67	Cape Sabine, Pitmegea River
22	Ekiatan', Laguna Ekiatan, Kelyun'ya, Mys Shmidta, Rypkarpyy	68	Agiak Lagoon, Punuk Lagoon
23	Emuem, Kemuem, Koyvel'khveyergin, Laguna Tengergin, Tenkergin	69	Cape Beaufort, Omalik Lagoon
24	No place names	70	Kuchaurak Creek, Kuchiak Creek
25	Laguna Amguema, Ostrov Leny, Yulinu	71	Kukpowruk River, Naokok, Naokok Pass, Sitkok Point
26	Ekugvaam, Reka Ekugvam, Kepin, Pil'khin	72	Epizetka River, Kokolik River, Point Lay, Siksrikpak Point
27	Laguna Nut, Rigol'	73	Akunik Pass, Tungaich Point, Tungak Creek
28	Kamynga, Ostrov Kardkarpko, Kovlyuneskin, Mys Vankarem, Vankarema, Laguna Vankarem	74	Kasegaluk Lagoon, , Solivik Island, Utukok River
29	Akanatkhyrgyn, Nutpel'men, Mys Onman, Vel'may	75	Akeonik, Icy Cape, Icy Cape Pass
30	Laguna Kunergin, Nutepynmyn, Pyngopil'khin, Laguna Pyngopil'khin	76	Akoliakatat Pass, Avak Inlet, Tunalik River
31	Alyatki, Zaliv Tasytkhin, Kolyuchin Bay	77	Mitliktavik, Nivat Point, Nokotlek Point, Ongorakvik River
32	Mys Dzhenretlen, Eynenekvyk, Lit'khekay-Polar Station	78	Kilmantavi, Kuk River, Point Collie, Sigeakruk Point,
33	Neskan, Laguna Neskan, Mys Neskan	79	Point Belcher, Wainwright, Wainwright Inlet
34	Emelin, Ostrov Idlidlya, I, Memino, Tepken,	80	Eluksingiak Point, Igklo River, Kugrua Bay
35	Enurmino, Mys Keylu, Netakeniskhvin, Mys Neten,	81	Peard Bay, Point Franklin, Seahorse Islands, Tachinisok Inlet
36	Mys Chechan, Mys Ikigur, Keniskhvik, Mys Serditse Kamen	82	Skull Cliff
37	Chegitun, Utkan, Mys Volnistyy	83	Nulavik, Loran Radio Station
38	Enmytagyn, Inchoun, Inchoun, Laguna Inchoun, Mitkulino, Uellen, Mys Unikyn	84	Walakpa River, Will Rogers and Wiley Post Memorial
39	Cape Dezhnev, Mys Inchoun, Naukan, Mys Peek, Uelen, Laguna Uelen, Mys Uelen	85	Barrow, Browerville, Elson Lagoon
40	Ah-Gude-Le-Rock, Dry Creek, Lopp Lagoon, Mint River	86	Dease Inlet, Plover Islands, Sanigaruak Island
41	Ikpek, Ikpek Lagoon, Pinguk River, Yankee River	87	Igalik Island, Kulgurak Island, Kurgorak Bay, Tangent Point
42	Arctic Lagoon, Kugrupaga Inlet, Nuluk River	88	Cape Simpson, Piasuk River, Sinclair River, Tulimanik Island
43	Sarichef Island, Shishmaref Airport	89	Ikpikpuk River, Point Poleakoon, Smith Bay
44	Cape Lowenstern, Egg Island, Shishmaref, Shishmaref Inlet	90	Drew Point, Kolovik, McLeod Point,
45	No place names	91	Lonely AFS Airport, Pitt Point, Pogik Bay, Smith River

ID	Geographic Place Names	ID	Geographic Place Names
46	Cowpack Inlet, Cowpack River, Kalik River, Kividlo, Singeak, Singeakpuk River, White Fish Lake	**92**	Cape Halkett, Esook Trading Post, Garry Creek
93	Atigaru Point, Eskimo Islands, Harrison Bay, Kalikpik River, Saktuina Point	**114**	Nunaluk Spit
94	Fish Creek, Tingmeachsiovik River	**115**	Herschel Island
95	Anachlik Island, Colville River, Colville River Delta	**116**	Ptarmagin Bay
96	Kalubik Creek, Oliktok Point, Thetis Mound,	**117**	Roland & Phillips Bay, Kay Point
97	Beechey Point, Bertoncini , Bodfish, Cottle and, Jones Islands, Milne Point, Simpson Lagoon	**118**	Sabine Point
98	Gwydyr Bay, Kuparuk River, Long Island	**119**	Shingle Point
99	Duck Island, Foggy Island, Gull Island, Heald Point, Howe Island, Niakuk Islands, Point Brower	**120**	Trent and Shoalwater Bays
100	Foggy Island Bay, Kadleroshilik River, Lion Point, Shaviovik River, Tigvariak Island	**121**	Shallow Bay, West Channel
101	Bullen Point, Point Gordon, Reliance Point	**120**	Trent and Shoalwater Bays
102	Flaxman Island, Maguire Islands, North Star Island, Point Hopson, Point Sweeney, Point Thomson, Staines River	**121**	Shallow Bay, West Channel
103	Brownlow Point, Canning River, Tamayariak River	**122**	No place names
104	Camden Bay, Collinson Point, Katakturuk River, Konganevik Point, Simpson Cove	**123**	Outer Shallow Bay, Olivier Islands
105	Anderson Point, Carter Creek, Itkilyariak Creek, Kajutakrok Creek, Marsh Creek, Sadlerochit River	**124**	Middle Channel, Gary Island
106	Arey Island, Arey Lagoon, Barter Island, Hulahula River, Okpilak River	**125**	Kendall Island
107	Bernard Harbor, Jago Lagoon, Kaktovik, Kaktovik Lagoon	**126**	North Point, Pullen Island
108	Griffin Point, Oruktalik Lagoon, Pokok Lagoon	**127**	Hendrickson Island, Kugmallit Bay
109	Angun Lagoon, Beaufort Lagoon, Nuvagapak Lagoon,	**128**	Tuktoyaktuk, Tuktoyaktuk Harbour
110	Aichilik River, Egaksrak Lagoon, Egaksrak River, Icy Reef, Kongakut River, Siku Lagoon	**129**	Warren Point
111	Demarcation Bay, Demarcation Point, Gordon, Pingokraluk Lagoon	**130**	Hutchison Bay
112	Clarence Lagoon, Backhouse River	**131**	McKinley Bay, Atkinson Point
113	Komakuk Beach, Fish Creek	**132**	Kidney Lake, Nuvorak Point

Key: ID = identification (number).
Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-19. Grouped Land Segment ID, Geographic Names, Land Segments ID's which make up the Grouped Land Segment and Vulnerability.

GLS ID	Grouped Land Segment Name	Land Segment ID's	Vunerable	MAP
133	Mys Blossom	1, 12	July-November	A-4c
134	Bukhta Somnitel'naya	10, 11	July-November	A-4c
135	Kolyuchin Bay	30, 31, 33, 34	June-November	A-4c
136	Ostrov Idlidlya	33,34	July-November	A-4c
137	Mys Serditse Kamen	35, 36	July-November	A-4c
138	Chukotka Coast Haulout	35-39	July-November	A-4c
139	Bering Land Bridge National Preserve	41, 42, 45-50	January-December	A-4c
140	Noatak River	54-57	January-December	A-4c
141	Cape Krusenstern National Monument	57-59	January-December	A-4a
142	Wulik and Kivilina Rivers	60-61	January-December	A-4a
143	WAH Insect Relief	61-71	July - August	A-4c
144	Alaska Maritime National Wildlife Refuge	62, 63, 65	January-December	A-4a
145	Cape Lisburne	65, 66, 67	August-November	A-4b
146	Ledyard Brown Bears	65-70	June-October	A-4b
147	Point Lay Haulout	71-74	January-December	A-4a
148	Kasegaluk Brown Bears	73-77	June-October	A-4b
149	National Petroleum Reserve Alaska	76, 77, 80-83, 86-93	January-December	A-4c
150	Kasegaluk Lagoon Special Area (NPR-A)	76-77	January-December	A-4c
151	Kuk River	78-79	January-December	A-4b
152	TCH Insect Relief/Calving	85-95	May - August	A-4b
153	Smith Bay Spotted Seal Haulout	88-89	May-October	A-4b
154	Teshekpuk Lake Special Area (NPR-A)	89-93	January-December	A-4c
155	Harrison Bay Spotted Seal Haulout	95, 96	June – September	A-4b
156	CAH Insect Relief/ Calving	96-103	July - August	A-4b
157	96-115 Summer	96-115	June- August	A-4a
158	Beaufort Muskox Habitat	97-98	November - May	A-4b
159	99-115 Fall	99-115	September-November	A-4b
160	102-110 Winter	102-110	December-February	A-4b
161	Arctic National Wildlife Refuge	103-111	January-December	A-4b
162	PCH Insect Relief	103-111	July - August	A-4b
163	PCH Calving	106-109, 112-117	May-June	A-4a
164	Yukon Musk Ox Wintering	111-115	November-April	A-4a
165	Ivvavik National Park (Canada)	112-117	January-December	A-4b
166	112-119 Spring	112-119	March-May	A-4b
167	112-121 Winter	112-121	December-February	A-4a
168	Yukon Moose	116-118	January-December	A-4b
169	Tarium Nirutait Marine Protected Area	119,120,121,122,124,127	January-December	A-4b
170	122-132 Spring	122-132	March-May	A-4a
171	122-132 Winter	122-132	December-February	A-4a
172	Kendall Island Bird Sanctuary (Canada)	124-125	May-October	A-4b
173	Tuktoyaktuk/Cape Bathurst Caribou Ins. R	126-132	July - August	A-4b
174	Russia Chukchi Coast Marine Mammals	1-39	July-November	A-4c
175	Russia Chukchi Coast	1-39	January-December	A-4c
176	United States Chukchi Coast	40-84	January-December	A-4c
177	United States Beaufort Coast	85-111	January-December	A-4a
178	Canada Beaufort Coast	112-132	January-December	A-4a

Source: USDOI, BOEM, Alaska OCS Region (2014).
Notes: CAH– Central Arctic Herd; PCH–Porcupine Caribou Herd; TCH–Teshekpuk Caribou Herd; WAH–Western Arctic Herd

Table A.1-20. Chukchi Sea Lease Sale 193 Leased Area: Assumptions about How Launch Areas are Serviced by Pipelines for the Oil-Spill-Trajectory.

Alternative I or IV		Alternative III	
Launch Area	**Serviced by Pipelines**	**Launch Area**	**Serviced by Pipelines**
LA01	P02, P03, P04, P05, P06	LA01	P02, P03, P04, P05, P06
LA04	P02, P03	LA04	P02, P03
LA05	P05, P06	LA05	P05, P06
LA06	P08, P09	LA06	P08, P09
LA10	P03	LA10a	P03
LA11	P06	LA11a	P06

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-21. Leased Area: Estimated Mean Number of Large Platform, Pipeline and Total Spills for Alternatives I, III or IV.

Alt.No.	Alternative Name	Mean Number of Platform/ Well Spills	Mean Number of Pipeline Spills	Mean Number of Spills Total
I, III, or IV	Proposed Action and Alts	0.5	0.9	1.4
2	No Action	0	0	0

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-22. Leased Area: Estimated Chance of One or More Large Platform, Pipeline and Total Spills Occurring for Alternatives I, III or IV.

Alt.No.	Alternative Name	Percent Chance of One or More Platform/ Well Spills	Percent Chance of One or More Pipeline Spills	Percent Chance of One or More Spills Total
1, 3, or 4	Proposed Action and Alts	39	59	75
2	No Action	0	0	0

Source: USDOI, BOEM, Alaska OCS Region (2014).

Table A.1-23. Small Refined and Crude and Condensate Oil Spills: Range Assumed Showing Total Over the Life and Annual Number and Volume of Spills Over Exploration and Delineation and Development and Production Activities.

Activity Phase	Life of Exploration Estimated Total Number of Small Spills	Estimated Total Volume of Small Spills (bbls)	Estimated Annual Number of Small Spills	Estimated Annual Volume of Small Spills (bbls)
Refined Oil Spills				
Exploration G&G Activities	0 – 15	0 – <15 or <27	0 – 3	0 – <3 or <13
Exploration & Delineation Drilling Activities	0 – 20	0 - <145	0 – 2	0 - <55
Development and Production	0 – 520	0 -1,600	0 - 12	0 – 36
Small Crude and Natural Gas Liquid Oil Spills				
Development and Production	0– 222[1]	0- 2,000	0 - 5	0 - 700

Note: 1: 2 spills are the median spill size of 700 bbl; 220 spills are median spill size of 3 bbl.
Source: USDOI, BOEM, Alaska OCS Region (2014)

Table A.1-24. Fate and Behavior of a Hypothetical 50-Barrel Diesel Fuel Oil Spill.

Scenario Element	Summer Spill[1]				
Time After Spill in Hours	1	6	12	24	48
Oil Remaining (%)	96	65	31	4	0
Oil Naturally Dispersed (%)	3	28	57	79	83
Oil Evaporated (%)	1	7	12	17	17

Notes: Calculated with the SINTEF oil-weathering model Version 4.0 of Reed et al. (2005) and assuming diesel fuel no 2. Summer (July through October), 8-knot wind speed, 2 degrees Celsius water temperature, 0.4-meter wave height.

Table A.1-25. Fate and Behavior of a Hypothetical 1 or 13-Barrel Diesel Fuel Oil Spill.

Scenario Element	Summer Spill[1]				Meltout Spill[2]			
1 bbl								
Time After Spill in Hours	6	12	24	48	24	72	144	240
Oil Remaining (%)	52	15	0	na	47	9	0	na
Oil Dispersed (%)	37	67	79	na	23	50	56	na
Oil Evaporated (%)	11	18	21	na	30	41	44	na
13 bbl								
Time After Spill in Hours	6	12	24	48	24	72	144	240
Oil Remaining (%)	75	45	11	0	68	26	3	0
Oil Dispersed (%)	18	42	70	79	11	38	54	56
Oil Evaporated (%)	7	13	19	21	21	36	43	44

Notes: Calculated with the SINTEF oil-weathering model Version 4.0 of Reed et al. (2005) and assuming diesel fuel no 2, na means not applicable.
Summer (July through October), 8-knot wind speed, 2 degrees Celsius water temperature, 0.4-meter wave height.

Table A.1-26. Fate and Behavior of a Hypothetical 20,000-bbl Crude Oil Spill in the Chukchi Sea.

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill (Days)	1	3	10	30	1	3	10	30
Oil Remaining (%)	61	53	36	13	67	58	47	35
Oil Dispersed (%)	10	16	29	50	4	10	17	27
Oil Evaporated (%)	29	31	35	37	29	32	36	38

Table A.1-27. Fate and Behavior of a Hypothetical 60,000-bbl Crude Oil Spill in the Chukchi Sea.

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	68	62	51	30	71	65	58	48
Oil Dispersed (%)	5	8	16	33	2	5	9	15
Oil Evaporated (%)	27	30	33	37	27	30	33	37

Notes for Tables A.1-26 and A.1-27:
Calculated with the SINTEF oil-weathering model Version 3.0 of Reed et al. (2005) and a 35 API crude oil.
[1] Summer (Open Water), Spill is assumed to occur in open water, 8-knot wind speed, 2 degrees Celsius, 0.4-meter wave height.
[2] Meltout Spill (Oil melts out of sea ice). Spill is assumed to occur into first-year pack ice, freeze into ice and melt out, pools 2-centimeter thick on ice surface for 2 days at -1 degrees Celsius prior to meltout into 50% ice cover, 10-knot wind speed, and 0.1 meter wave heights.
Source: USDOI, BOEMRE, Alaska OCS Region (2011)

Table A.1-28. Discontinuous Area Contacted in Square Kilometers by a Very Large Crude Oil Spill in the Chukchi Sea during Summer or Winter.

Summer						
Days	LA01	LA04	LA05	LA06	LA10	LA11
3	48,933	45,056	49,223	44,029	47,284	50,338
10	147,416	144,924	151,882	143,064	144,088	144,541
30	377,142	326,835	363,907	383,310	306,120	336,633
60	573,094	480,832	523,891	565,476	422,824	477,040
180	637,098	666,055	680,475	683,904	647,967	677,666
360	638,882	670,347	684,167	688,507	658,041	690,355
Winter						
Days	LA08	LA09	LA10	LA11	LA12	LA13
3	50,904	47,916	51,944	45,014	48,249	52,211
10	154,577	157,041	158,780	142,699	139,900	132,976
30	431,600	386,638	407,176	406,943	336,344	359,303
60	536,152	474,469	527,245	518,842	394,509	469,345
180	591,573	583,690	617,492	594,224	465,086	573,977
360	592,492	585,847	620,622	596,018	468,628	580,376

Source: USDOI, BOEM, Alaska OCS Region (2015)

Table A.1-29. Alaska North Slope Facility and Pipeline Crude Oil Spills 1985-2013 (≥ 500 bbl).

Spill Date	Facility Type	Facility Operator	Oil Type	Spill Location	Spill Cause	Low Spill Quantity (bbl)	High Spill Quantity (bbl)
28-Jul-89	Production Processing	Conoco, Inc.	Crude Oil	Milne Point Unit, Central Processing Facility	Facility Tank Leak–overfill	825	925
25-Aug-89	Pipeline	ARCO Alaska, Inc.	Crude Oil	Kuparuk River Unit, Drill Site 2-U	Pipeline Leak–corrosion of block valve	340[2]	603[2]
10-Dec-90	Production Well Site	ARCO Alaska, Inc.	Crude Oil	Lisburne Unit, Drill Site L-5	Facility Explosion	176[1]	600[1]
17-Aug-93	Production Processing	ARCO Alaska, Inc.	Crude Oil/ Produced Water	Kuparuk River Unit CPF 1	Tank Leak– Corrosion		675
26-Sep-93	Production Processing	BP Exploration (Alaska)	Crude Oil	Prudhoe Bay Unit, Gathering Center 2	Facility Tank Leak–overflow due to pump failure		650
21-Aug-00	Production Processing	BP Exploration (Alaska)	Crude Oil/ Produced Water	Prudhoe Bay Unit, Gathering Center 2	Facility Tank Leak–overflow due to control system failure	700	715[4]
19-Feb 01	Pipeline	BP Exploration (Alaska)	Crude Oil/	West Prudhoe Bay, between D-pad and gathering center	Pipeline Leak – Line Failure, Human Error	2254	608.33[2]
02-Mar-06	Pipeline	BP Exploration (Alaska)		Prudhoe Bay Unit, GC-2 34" Oil Transit Line	Pipeline Leak - Corrosion		5053.62[3]

Source: 1 Hart Crowser (2000), 2 ADEC 3. Unified Command 4. BPXA 5. Robertson et al., 2013

Table A.1-30. The Trans-Alaska Pipeline Crude Oil Spills 1977-2013 (≥ 500 bbl).

Spill Date	Facility Type	Spill Name	Spill Location	Spill Cause	Low Spill Quantity (bbl)	High Spill Quantity (bbl)	Quantity Used in Analysis
08-Jul-77	Pump Station	Pump Station 8	TAPS PS 8 (TAPS MP 489.2)	Facility Explosion [1,2,3] Unspecified 5	300 [2]	4,762 [2] 300 [1,3,5]	4,762[2]
19-Jul-77	Pipeline	Check Valve 7	TAPS MP 26 (Check Valve 7)	Pipeline Leak - equipment damage [1,2,3] Human Error [5]	1000 [1,2]	1,800 [1] 1,000 [3,5] 2,620 [2]	1,800 [1]
15-Feb-78	Pipeline	Steele Creek	TAPS MP 457	Pipeline Leak - intentional sabotage [1,3] Unspecified [5]	11,905 [1]	16,000 [1] 11,905 [3,5]	16,000[1]
10-Jun-79	Pipeline	Atigun Pass	TAPS MP 166 (N. side of Atigun Pass)	Pipeline Leak - line break [1,2,3,5]	1,500 [2]	7,143 [2] 1,500 [1,5] 5,267 [3]	7,143[2]
15-Jun-79	Pipeline	Little Tonsina	TAPS MP 734	Pipeline Leak - line break [1,2,3,5]	300 [2]	4000 [1,2] 300 [3,5]	4,000[1,2]
01-Jan-81	Pipeline	Check Valve 23	TAPS MP 114.6 (Check Valve 23)	Pipeline Leak - leaking valve	1,000 [2]	1,500 [1,3,4,5] 2,000 [6] 2,381[2]	2,381[2]
20-Apr-96	Pipeline	Check Valve 92	TAPS MP 539.7 (Check Valve 92)	Pipeline Leak - loose fitting	800 [1 2]	811 [1]	811[1]
4-Oct-01	Pipeline		TAPS MP 400	Pipeline Leak -intentional sabotage - bullet hole	6,800	6,800	6,800
12-May-10	Tank	Pump Station 9, Tank 190		Tank Leak - Circuit Failure Valve Control	na	2580[1,2]	2580[1,2]

Sources: [1] Alyeska Pipeline Service Company, [2] Alaska Department of Environmental Conservation, [3] Unknown, [4] Bureau of Land Management, [5] Joint Pipeline Office, [6] Oil Spill Intelligence Report

Table A.1-31. Oil Spill Rates and Spill-Size Categories Used To Estimate Large Crude Oil Spills For the Cumulative Analysis.

Location	Arctic Outer Continental Shelf		Alaska North Slope 1985-2013		Trans-Alaska Pipeline System Pipeline 1977-2013	
	Spill rate (spills/Bbbl)	Size category (bbl)	Spill rate (Spills/Bbbl)	Size category (bbl)	Spill rate Spills/Bbbl)	Size category (bbl)
Offshore	0.58 Beaufort 0.32 Chukchi	≥1,000	-	-	-	-
Onshore	-	-	0.63	≥500	0.54	≥500

Source: USDOI, BOEM, Alaska OCS Region (2014)

Table A.1-32. Cumulative Large Oil-Spill-Occurrence Estimates Resulting from Past, Present and Future Oil Production.

Category	Large Crude Oil Spills				
	Reserves and Resources (Bbbl)	Spill Rate[1]. (spills/Bbbl)	Size Category (bbl)	Assumed Size (bbl) Pipeline/Facility[2]	Assumed Number of Large Spills for Analysis
Lease Sale 193					
Alternatives I, III or IV	4.3	0.32	≥1,000	1.700/5,100	1-2
NPR-A (Future Production)					
Alternative D	0.76	0.63	≥500	700/700	0 -1
Colville Canning/State Beaufort Sea (Past, Present and Future)					
	3.15	0.63	≥500	700/700	2
Beaufort and Chukchi OCS [3] (Future)					
	3.1	0.58 & 0.32	≥1,000	1,700/5,100	0-1
TAPS Pipeline (Past, Present and Future)					
	11.21	0.54	≥500	4,000/na	2 on ANS[4]
Total[1]					
	11.21	-	-	-	5-8

Notes

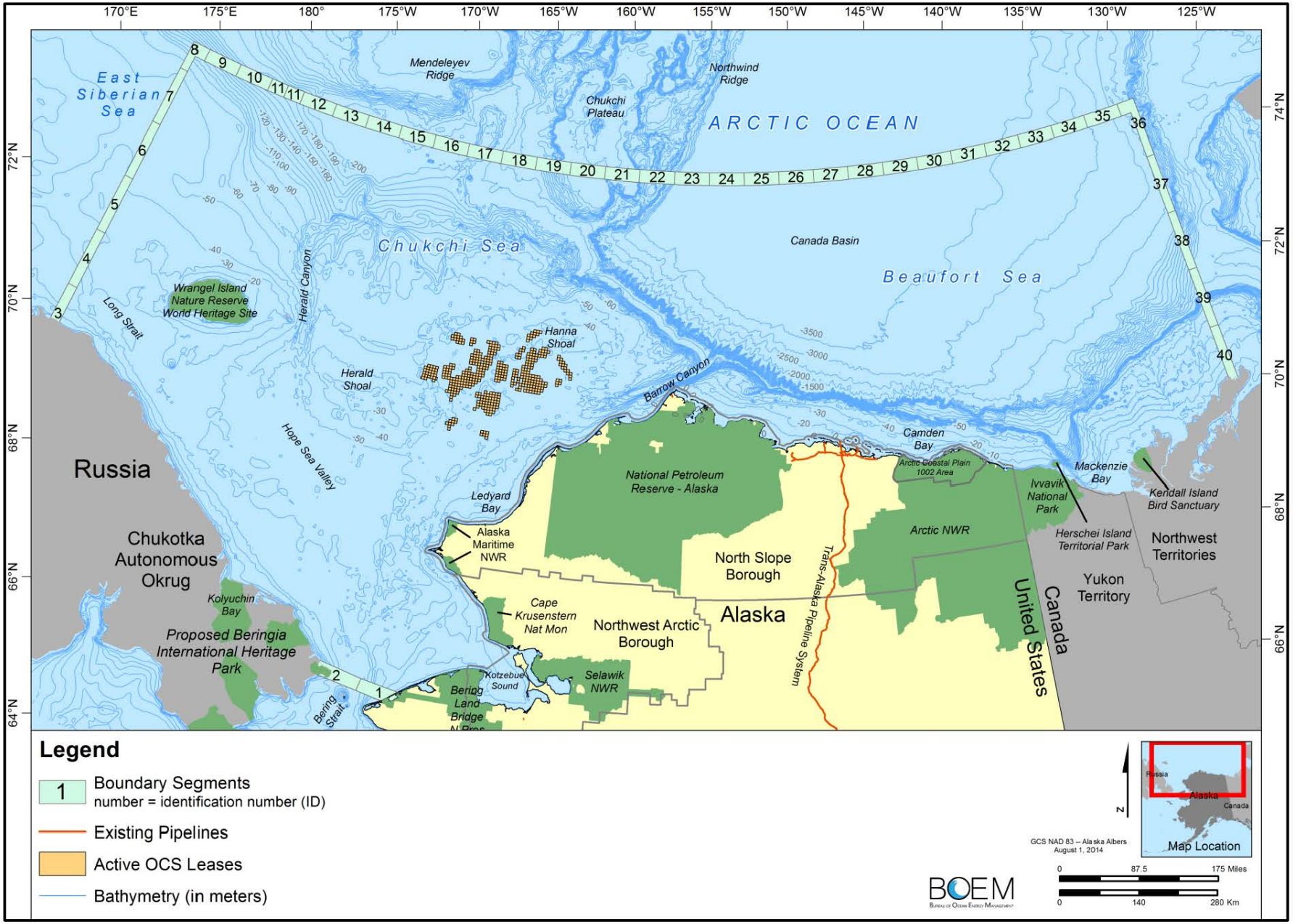
1 Large spill occurrence rates for Alaska North Slope, OCS and TAPS Pipeline are discussed in Appendix A. Section 4 and Section 8.

2. The first number is the assumed pipeline size and the second number is the assumed facility size. The median OCS pipeline or facility spill size is used for the assumed large spill size. For onshore North Slope the largest spill sizes are used.

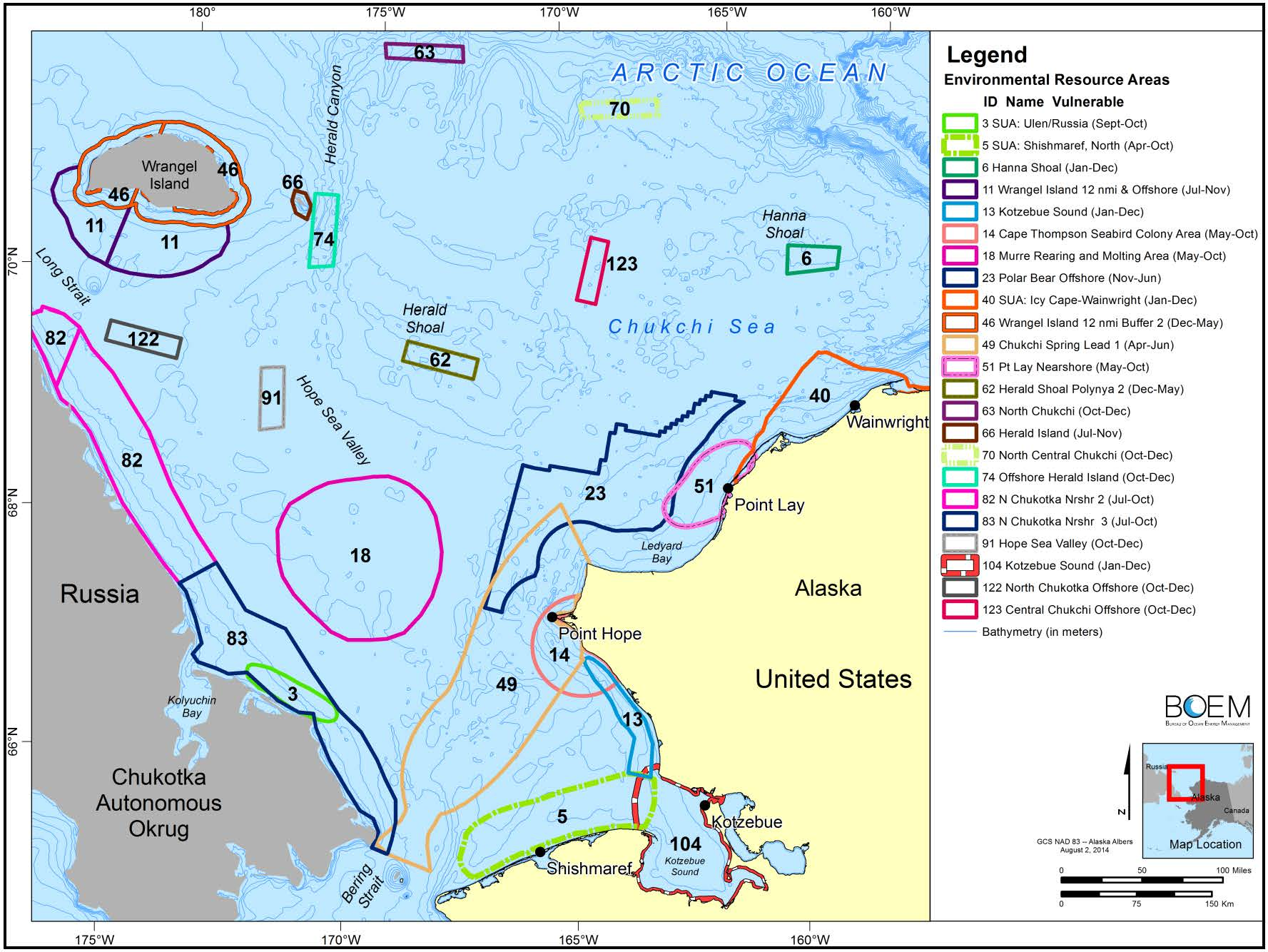
3. The values provided are the combined totals for the Beaufort and Chukchi OCS .

4 The estimated large TAPS pipeline spills include spills from the pipeline, pump stations, and associated tank farms and could occur along the entire length of TAPS. Of those spills, 2 could occur on the Alaska North Slope (ANS) and 4 along the rest of the pipeline length.

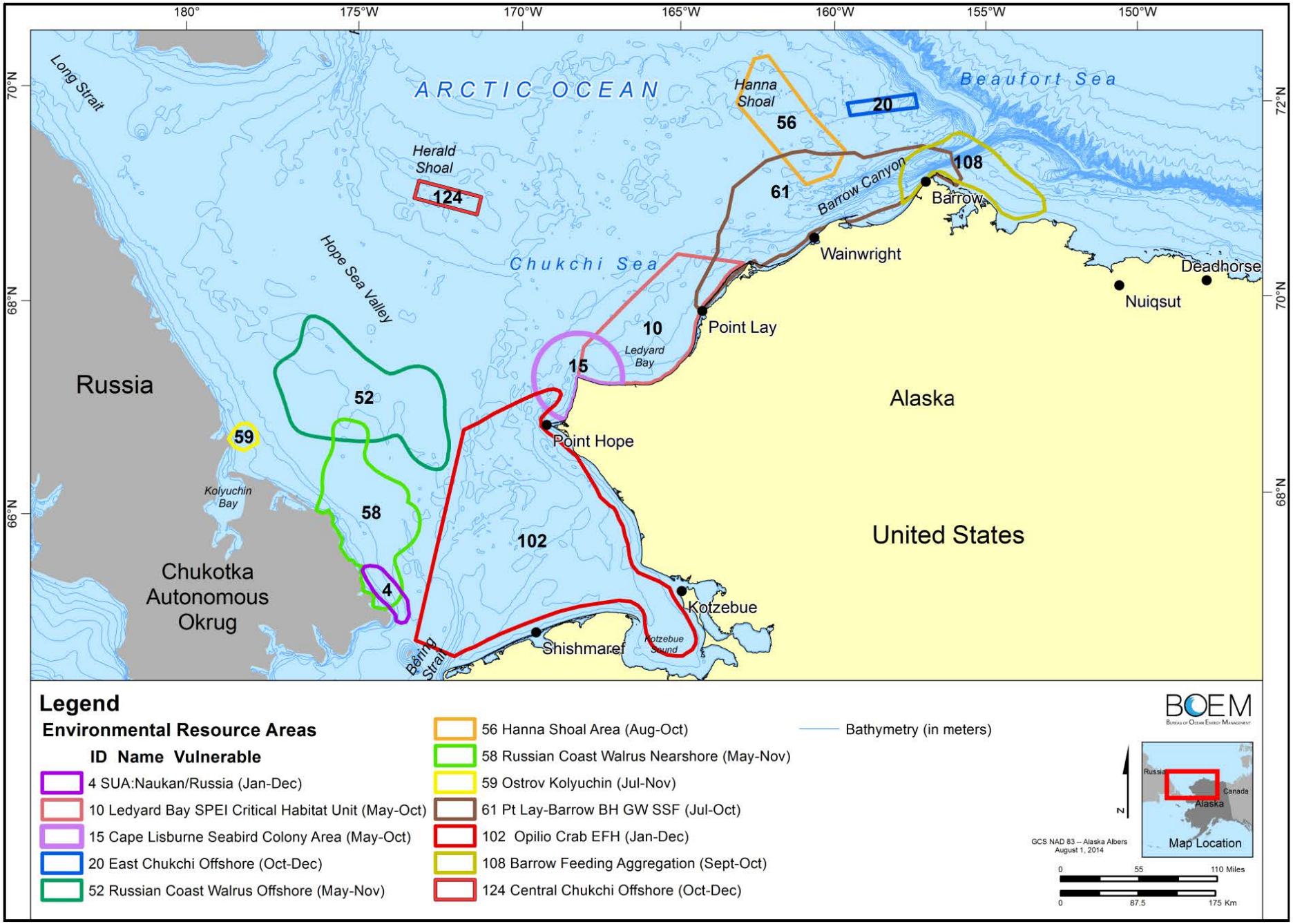
Appendix A Maps



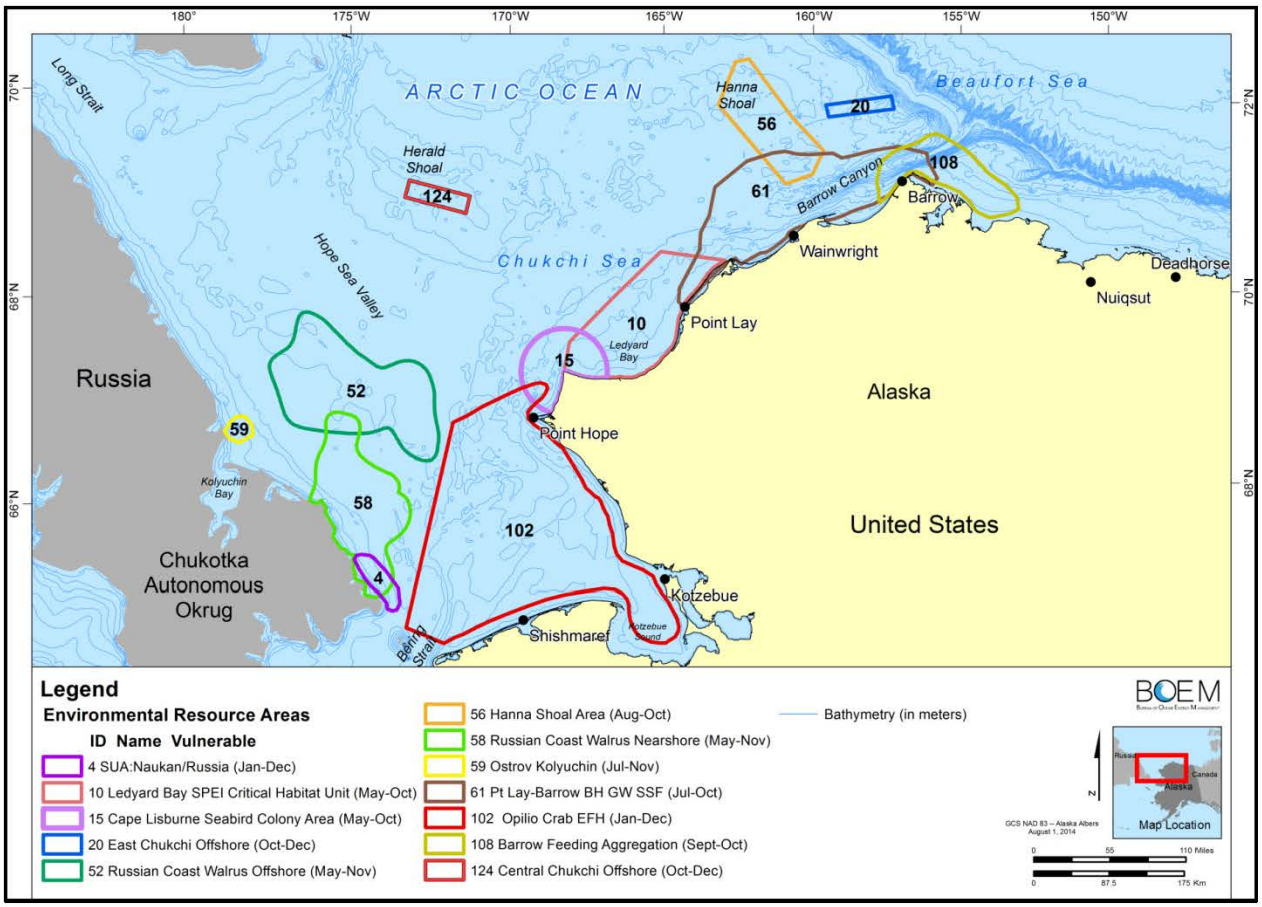
Map A-1. Study Area Used in the Oil-Spill Trajectory Analysis.

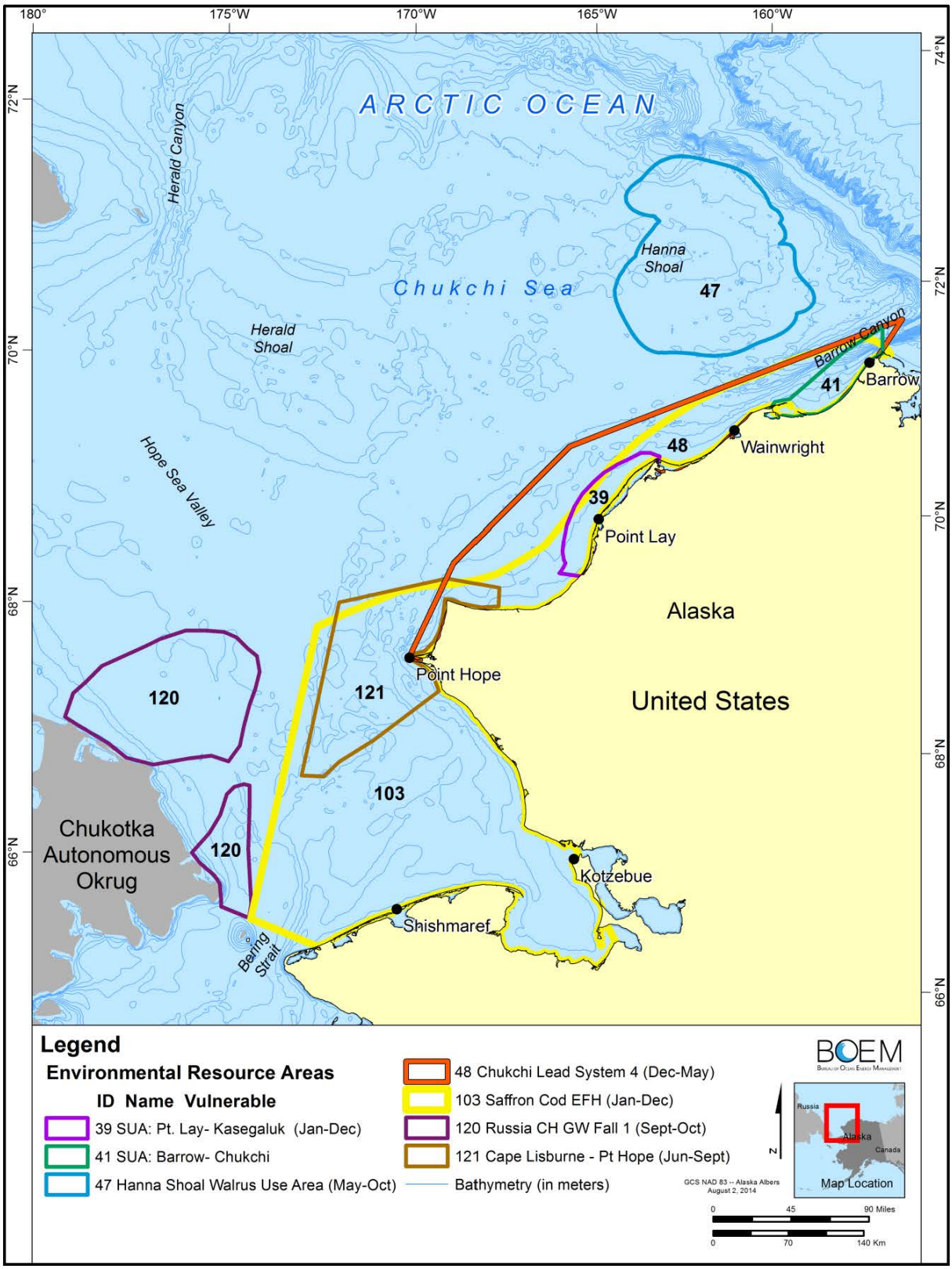


Map A-2a. Environmental Resource Areas Used in the Oil-Spill Trajectory Analysis.

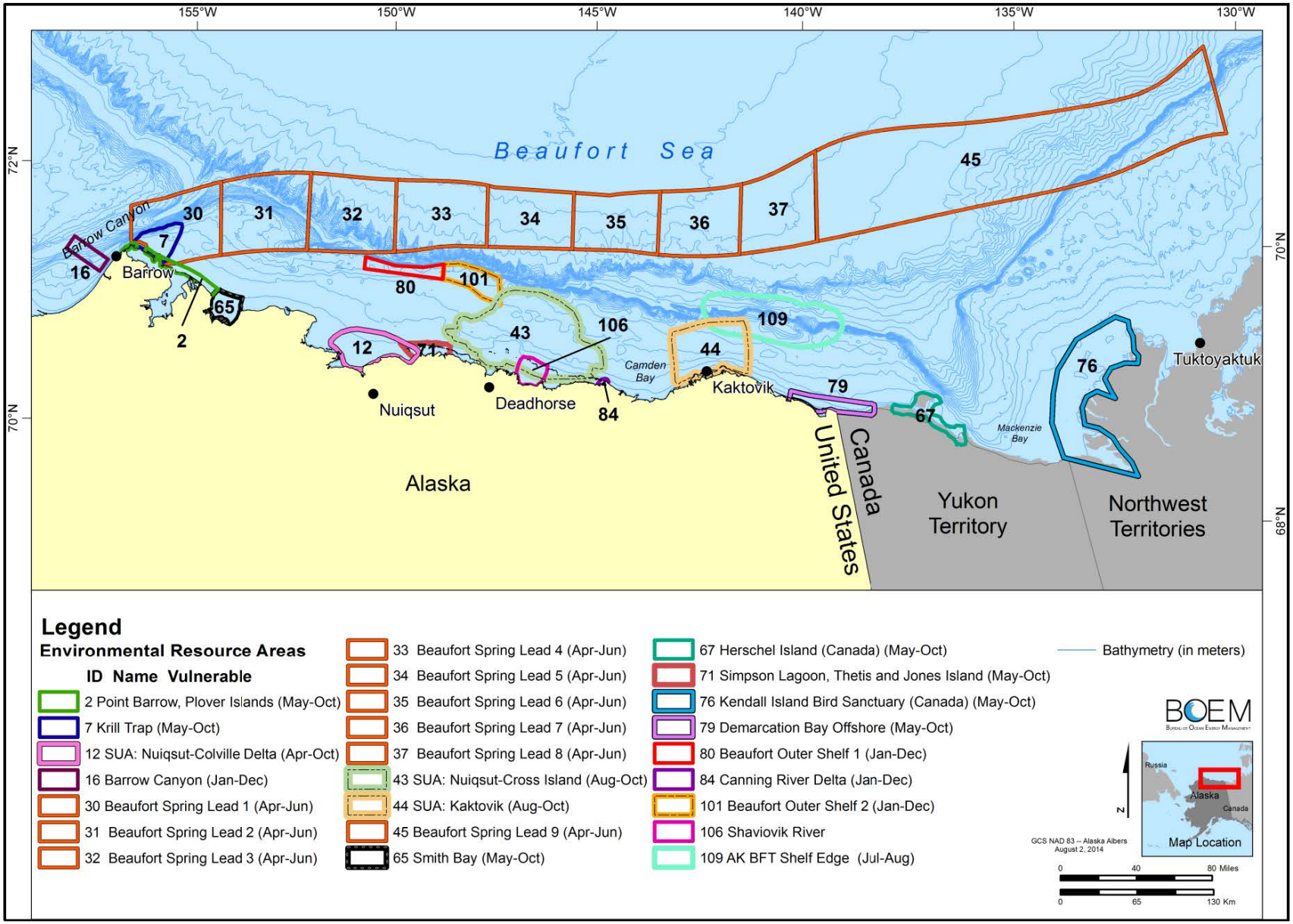


Map A-2b. Environmental Resource Areas Used in the Oil-Spill Trajectory Analysis.

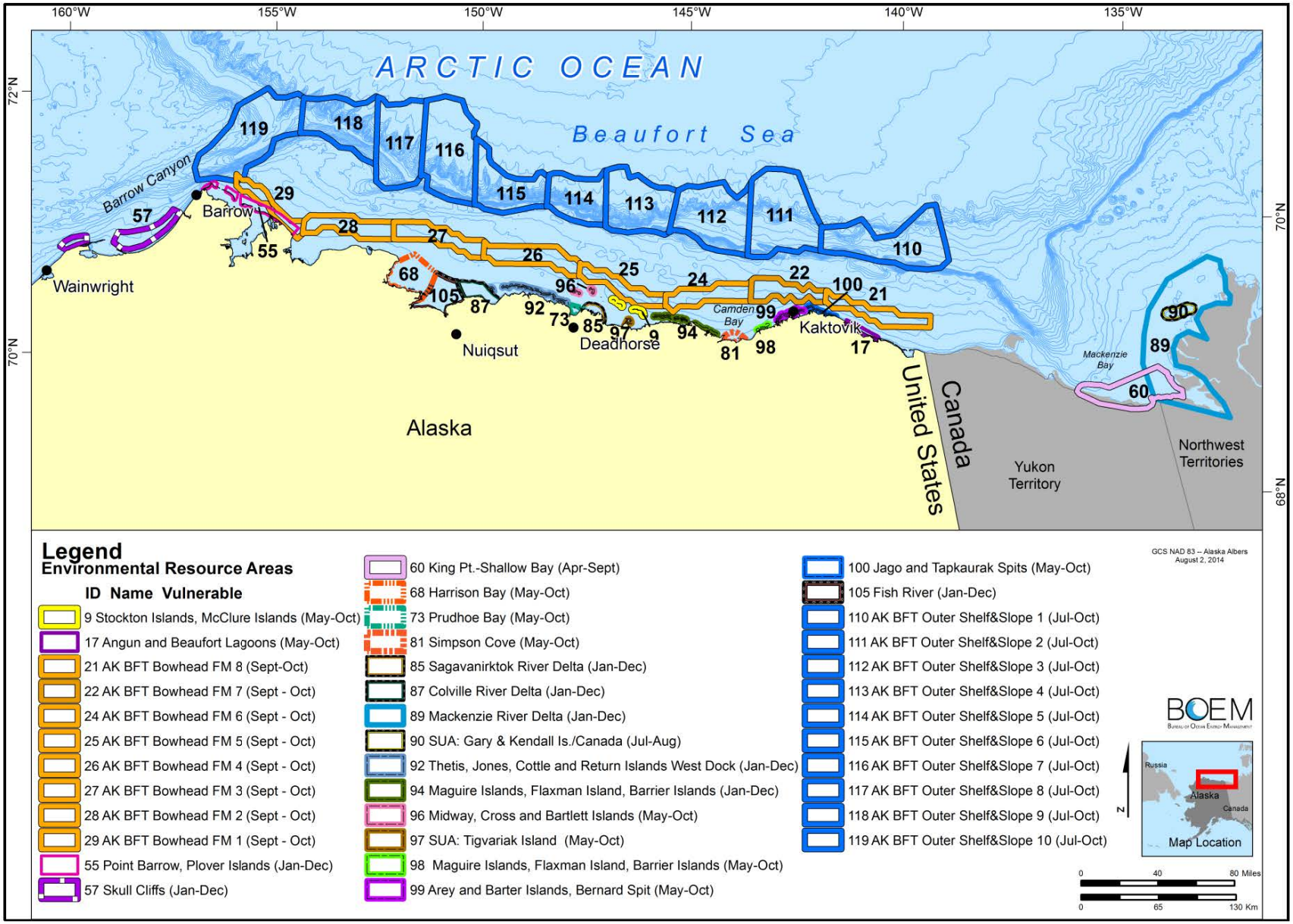

180°
175°W
170°W
165°W
160°W
155°W
150°W
70°N
68°N
66°N
72°N
ARCTIC OCEAN
Beaufort Sea
Chukchi Sea
Long Strait
Herald Shoal
124
Hanna Shoal
56
20
61
Barrow Canyon
108
Barrow
Wainwright
Deadhorse
Nuiqsut
Point Lay
10
Ledyard Bay
15
Hope Sea Valley
Russia
52
59
Kolyuchin Bay
58
4
Point Hope
Alaska
United States
102
Chukotka Autonomous Okrug
Kotzebue
Shishmaref
Bering Strait
Kotzebue Sound
Legend
Environmental Resource Areas
ID Name Vulnerable
4 SUA:Naukan/Russia (Jan-Dec)
10 Ledyard Bay SPEI Critical Habitat Unit (May-Oct)
15 Cape Lisburne Seabird Colony Area (May-Oct)
20 East Chukchi Offshore (Oct-Dec)
52 Russian Coast Walrus Offshore (May-Nov)
56 Hanna Shoal Area (Aug-Oct)
58 Russian Coast Walrus Nearshore (May-Nov)
59 Ostrov Kolyuchin (Jul-Nov)
61 Pt Lay-Barrow BH GW SSF (Jul-Oct)
102 Opilio Crab EFH (Jan-Dec)
108 Barrow Feeding Aggregation (Sept-Oct)
124 Central Chukchi Offshore (Oct-Dec)
Bathymetry (in meters)
BOEM
Canada
Alaska
Map Location
GCS NAD 83 – Alaska Albers
August 1, 2014
0
55
110 Miles
0
87.5
175 Km



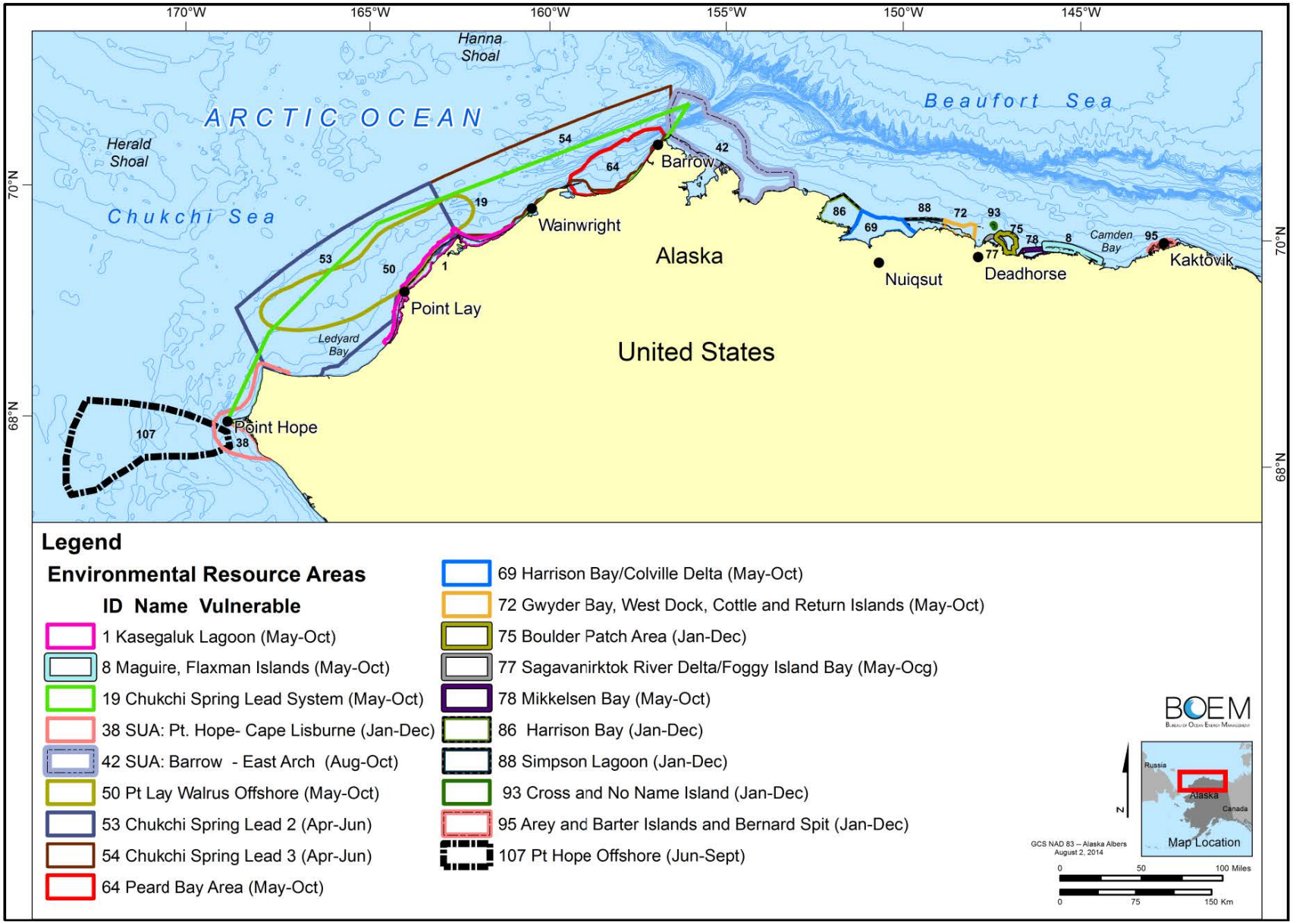
Map A-2c. Environmental Resource Areas Used in the Oil-Spill Trajectory Analysis.



Map A-2d. Environmental Resource Areas Used in the Oil-Spill Trajectory Analysis.

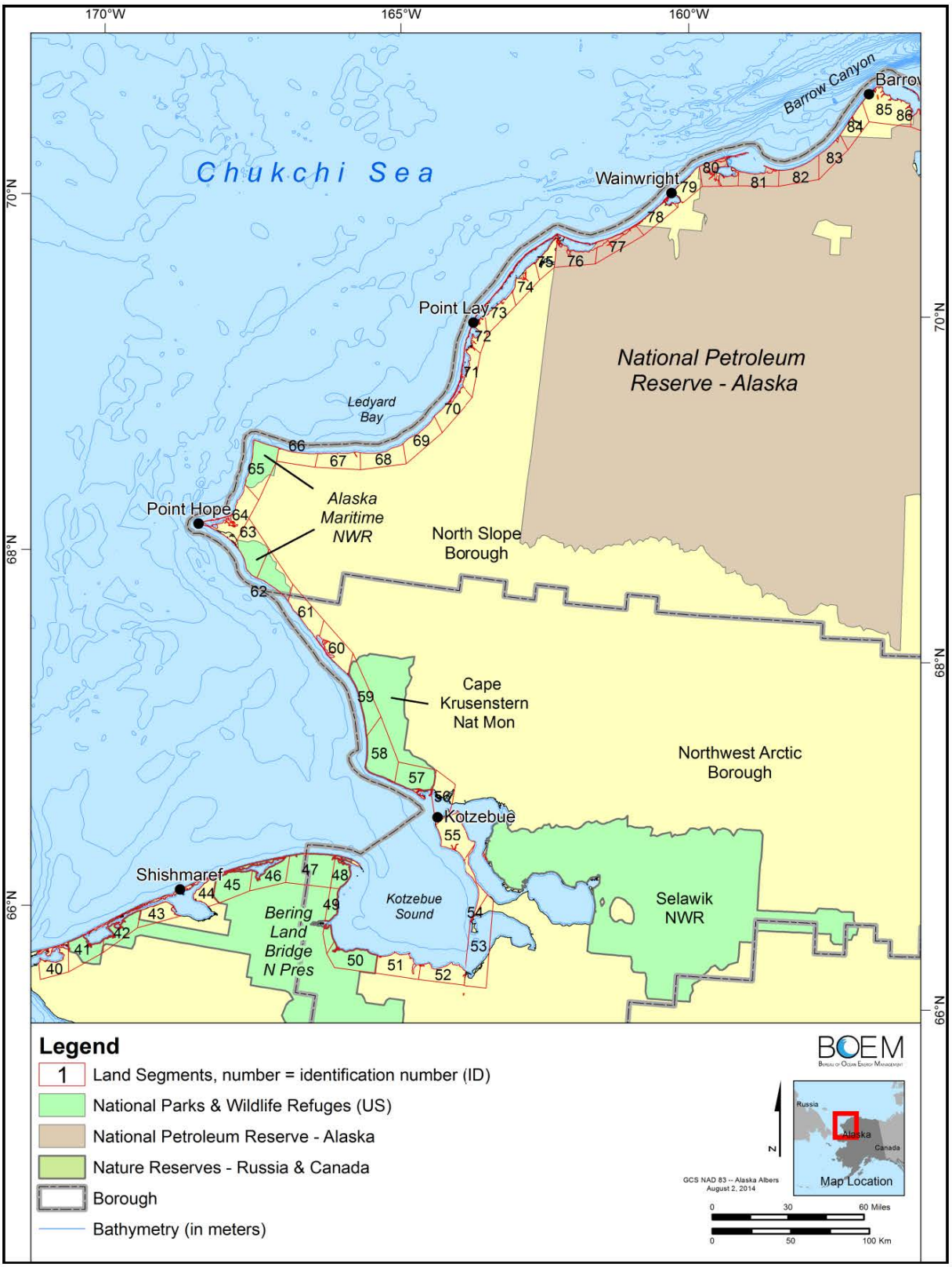


Map A-2e. Environmental Resource Areas Used in the Oil-Spill Trajectory Analysis.

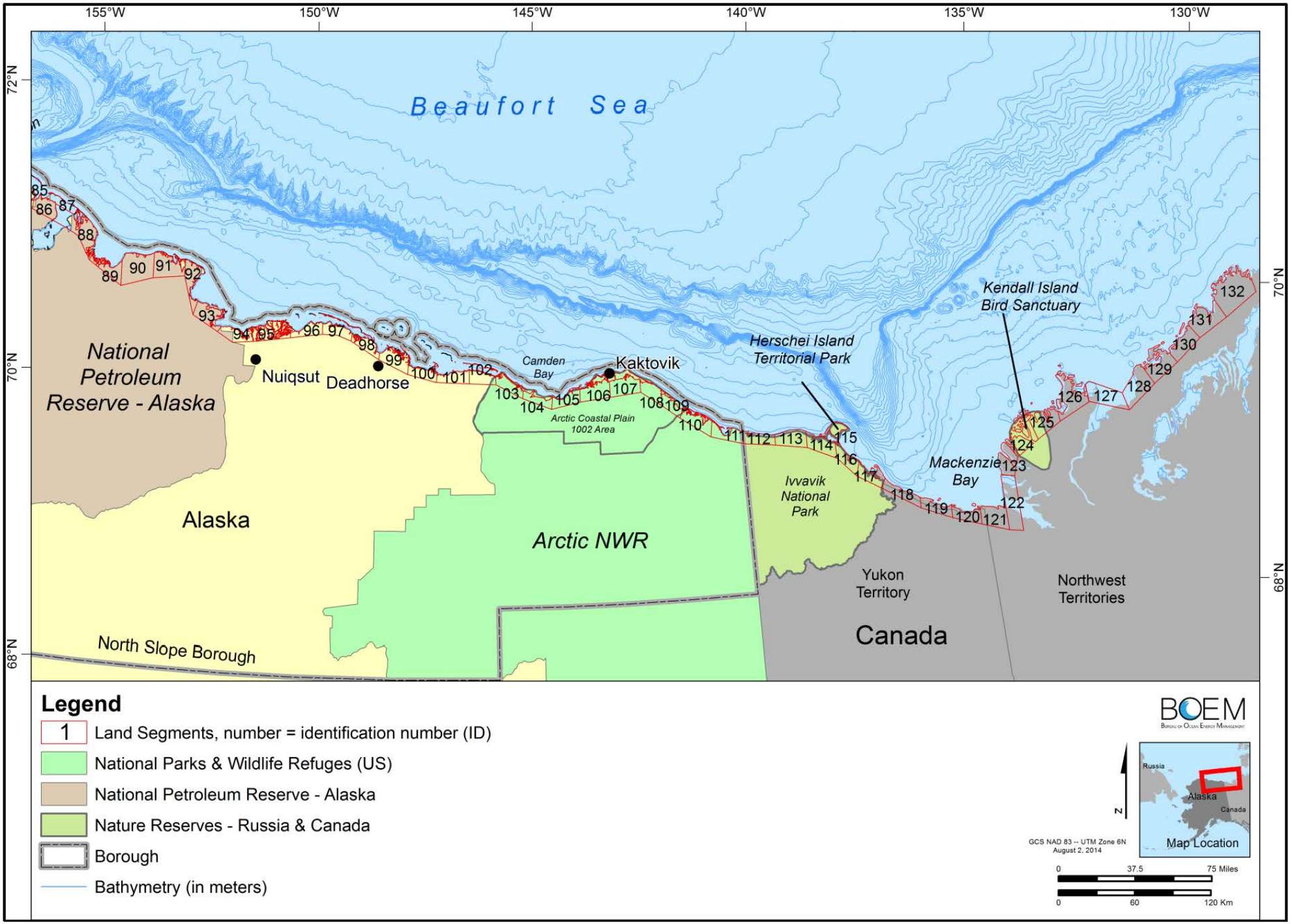


Map A-2f. Environmental Resource Areas Used in the Oil-Spill Trajectory Analysis.

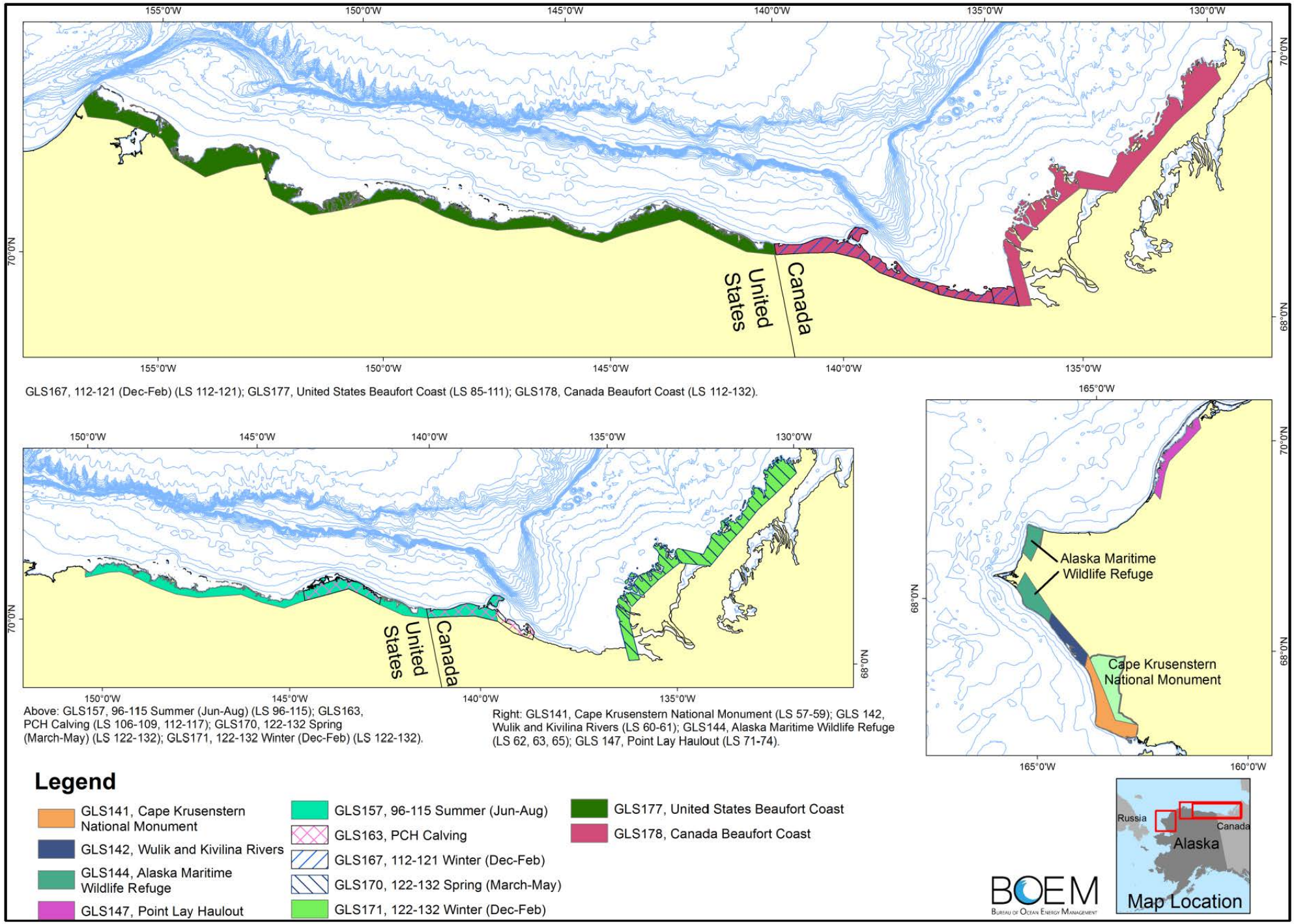
Map A-3a. Land Segments Used in the Oil-Spill Trajectory Analysis.



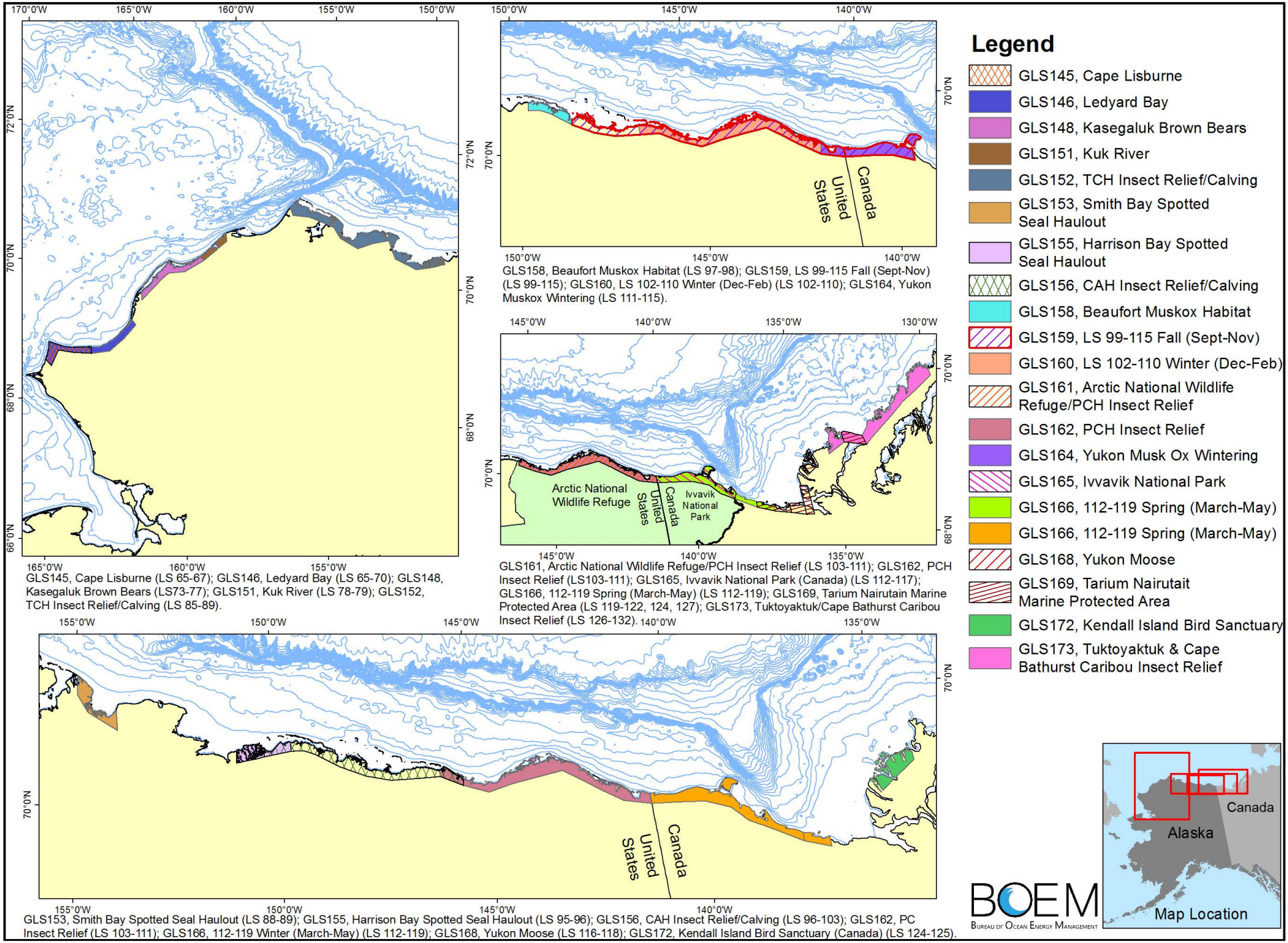
Map A-3b. Land Segments Used in the Oil-Spill Trajectory Analysis.



Map A-3c. Land Segments Used in the Oil-Spill Trajectory Analysis.



Map A-4a. Grouped Land Segments Used in the Oil-Spill Trajectory Analysis.



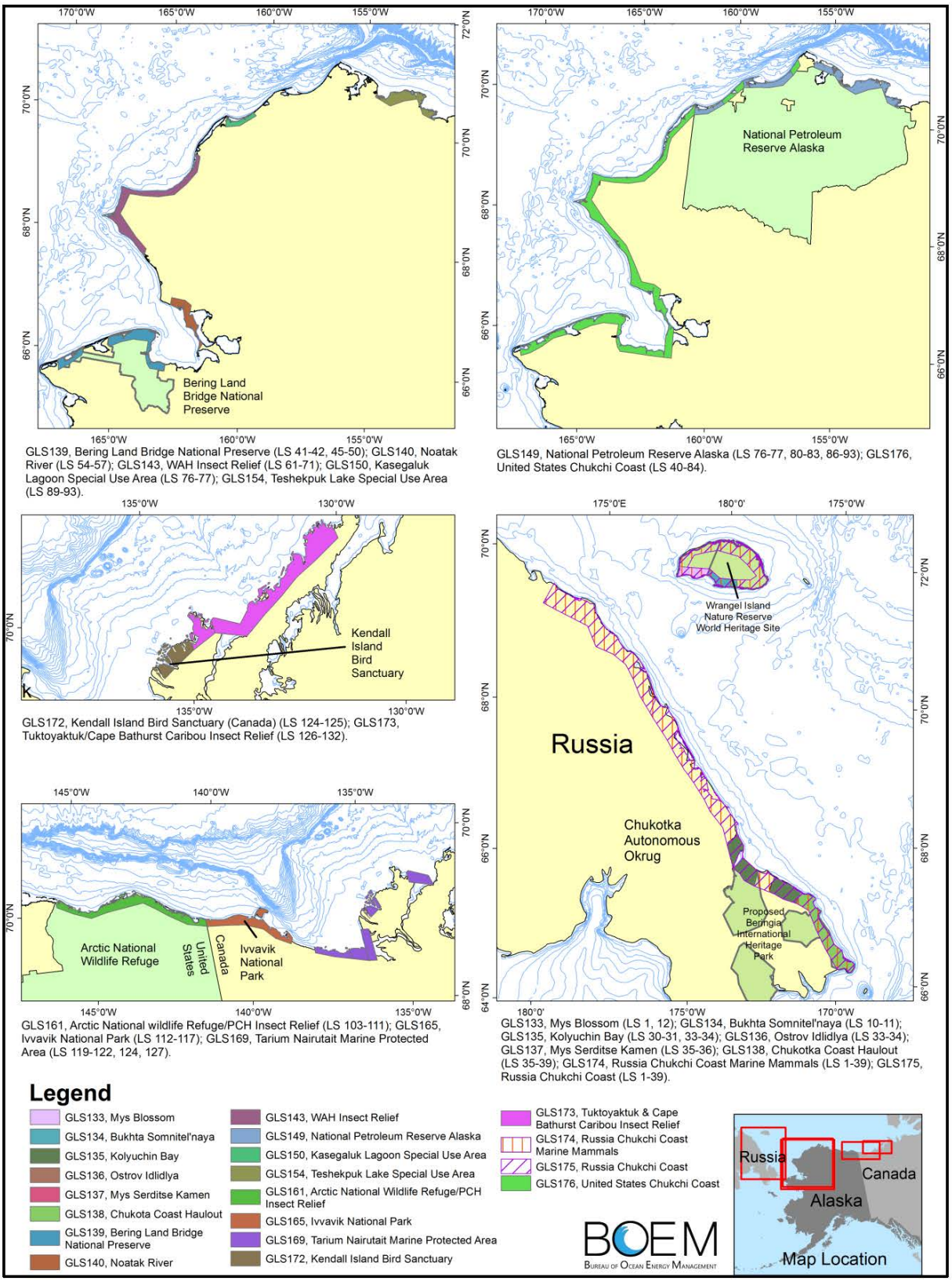
GLS145, Cape Lisburne (LS 65-67); GLS146, Ledyard Bay (LS 65-70); GLS148, Kasegaluk Brown Bears (LS73-77); GLS151, Kuk River (LS 78-79); GLS152, TCH Insect Relief/Calving (LS 85-89).

GLS158, Beaufort Muskox Habitat (LS 97-98); GLS159, LS 99-115 Fall (Sept-Nov) (LS 99-115); GLS160, LS 102-110 Winter (Dec-Feb) (LS 102-110); GLS164, Yukon Muskox Wintering (LS 111-115).

GLS161, Arctic National Wildlife Refuge/PCH Insect Relief (LS 103-111); GLS162, PCH Insect Relief (LS103-111); GLS165, Ivvavik National Park (Canada) (LS 112-117); GLS166, 112-119 Spring (March-May) (LS 112-119); GLS169, Tarium Nairutain Marine Protected Area (LS 119-122, 124, 127); GLS173, Tuktoyaktuk/Cape Bathurst Caribou Insect Relief (LS 126-132).

GLS153, Smith Bay Spotted Seal Haulout (LS 88-89); GLS155, Harrison Bay Spotted Seal Haulout (LS 95-96); GLS156, CAH Insect Relief/Calving (LS 96-103); GLS162, PC Insect Relief (LS 103-111); GLS166, 112-119 Winter (March-May) (LS 112-119); GLS168, Yukon Moose (LS 116-118); GLS172, Kendall Island Bird Sanctuary (Canada) (LS 124-125).

Map A-4b. Grouped Land Segments Used in the Oil-Spill Trajectory Analysis.



GLS139, Bering Land Bridge National Preserve (LS 41-42, 45-50); GLS140, Noatak River (LS 54-57); GLS143, WAH Insect Relief (LS 61-71); GLS150, Kasegaluk Lagoon Special Use Area (LS 76-77); GLS154, Teshekpuk Lake Special Use Area (LS 89-93).

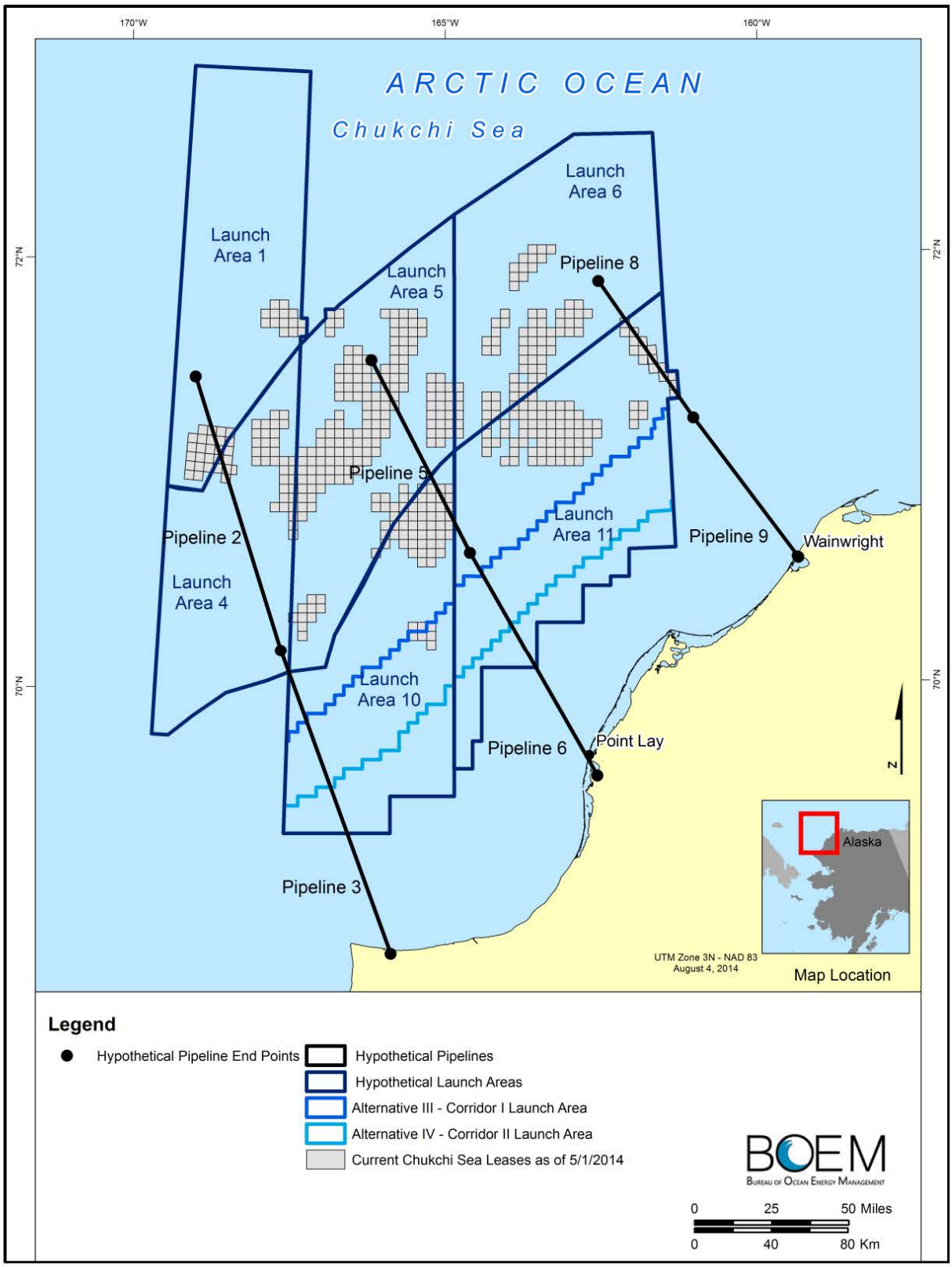
GLS149, National Petroleum Reserve Alaska (LS 76-77, 80-83, 86-93); GLS176, United States Chukchi Coast (LS 40-84).

GLS172, Kendall Island Bird Sanctuary (Canada) (LS 124-125); GLS173, Tuktoyaktuk/Cape Bathurst Caribou Insect Relief (LS 126-132).

GLS161, Arctic National wildlife Refuge/PCH Insect Relief (LS 103-111); GLS165, Ivvavik National Park (LS 112-117); GLS169, Tarium Nairutait Marine Protected Area (LS 119-122, 124, 127).

GLS133, Mys Blossom (LS 1, 12); GLS134, Bukhta Somnitel'naya (LS 10-11); GLS135, Kolyuchin Bay (LS 30-31, 33-34); GLS136, Ostrov Idlidlya (LS 33-34); GLS137, Mys Serditse Kamen (LS 35-36); GLS138, Chukotka Coast Haulout (LS 35-39); GLS174, Russia Chukchi Coast Marine Mammals (LS 1-39); GLS175, Russia Chukchi Coast (LS 1-39).

Map A-4c. Grouped Land Segments Used in the Oil-Spill Trajectory Analysis.



Map A-5. Hypothetical Launch Areas and Pipelines Used in the Oil-Spill Trajectory Analysis.

A.2. OSRA Conditional and Combined ProbabilityTables

Tables A.2-1 through A.2-72 represent conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location (launch area (LA) or pipeline (PL) will contact a certain location (environmental resource area, land segment, boundary segment, or grouped land segment). The tables are further organized as annual or seasonal (winter, summer). Tables A.2-1 through A.2-24 represent annual conditional probabilities while Table's A.2-25 through A.2-72 represent seasonal conditional probabilities. Tables A.2-73 through A.2-75 represent combined probabilities (expressed as percent chance) of one or more large spills, and the estimated number of spills (mean), occurring and contacting a resource over the assumed life of the leased area, Alternatives I, III or IV.

If the chance of contacting a given resource area is >99.5%, it is shown with a double asterisk (**). If the chance of a large spill contacting a resource area is <0.5%, it is shown with a dash (-). Resource areas with a <0.5% chance of contact from all LAs and PLs are not shown.

Tables A.2-1 through A.2-6 represent annual conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain environmental resource area (ERA) within:

Table A.2-1. 3 Days-(Annual-ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	-	-	-	-	-	1	-	2	-	7	-	7
1	Kasegaluk Lagoon Area	-	-	-	-	-	-	-	-	-	5	-	-
6	Hanna Shoal	-	-	-	10	-	2	-	-	-	-	20	-
7	Krill Trap	-	-	-	-	-	-	-	-	-	-	-	1
10	Ledyard Bay SPEI Critical Habitat Area	-	-	-	-	8	4	-	9	-	27	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	2	-	-	8	-	1	-	-
16	Barrow Canyon	-	-	-	-	-	1	-	-	-	-	1	6
18	Murre Rearing and Molting Area	-	-	-	-	-	-	-	1	-	-	-	-
19	Chukchi Spring Lead System	-	-	-	-	3	4	-	3	-	14	-	10
23	Polar Bear Offshore	-	1	-	-	39	16	-	38	1	43	-	3
38	SUA: Pt. Hope - Cape Lisburne	-	-	-	-	-	-	-	3	-	-	-	-
39	SUA: Pt. Lay - Kasegaluk	-	-	-	-	1	1	-	-	-	23	-	-
40	SUA: Icy Cape - Wainwright	-	-	-	-	1	10	-	-	1	12	1	57
41	SUA: Barrow - Chukchi	-	-	-	-	-	-	-	-	-	-	-	1
42	SUA: Barrow - East Arch	-	-	-	-	-	-	-	-	-	-	-	1
47	Hanna Shoal Walrus Use Area	-	-	2	31	-	13	-	-	2	-	51	19
48	Chukchi Lead System 4	-	-	-	-	6	9	-	7	-	29	-	22
49	Chukchi Spring Lead 1	-	-	-	-	1	-	-	3	-	-	-	-
50	Pt Lay Walrus Offshore	-	-	-	-	12	5	-	11	-	24	-	2
51	Pt Lay Walrus Nearshore	-	-	-	-	1	1	-	1	-	17	-	-
53	Chukchi Spring Lead 2	-	-	-	-	10	6	-	11	-	19	-	1
54	Chukchi Spring Lead 3	-	-	-	-	-	4	-	-	-	2	-	17
56	Hanna Shoal Area	-	-	-	9	-	3	-	-	-	-	19	5
57	Skull Cliffs	-	-	-	-	-	1	-	-	-	-	-	7
61	Pt Lay-Barrow BH GW SFF	-	-	1	2	2	13	-	-	3	15	7	34
62	Herald Shoal Polynya 2	-	3	-	-	-	-	2	-	-	-	-	-
64	Peard Bay Area	-	-	-	-	-	1	-	-	-	-	1	8
70	North Central Chukchi	2	-	-	-	-	-	-	-	-	-	-	-
102	Opilio Crab EFH	-	-	-	-	1	-	-	2	-	-	-	-
103	Saffron Cod EFH	-	-	-	-	4	8	-	13	1	29	2	44
108	Barrow Feeding Aggregation	-	-	-	-	-	-	-	-	-	-	-	1
119	AK BFT Outer Shelf&Slope 10	-	-	-	-	-	-	-	-	-	-	-	1
121	Cape Lisburne - Pt Hope	-	-	-	-	1	-	-	4	-	-	-	-
123	AK Chukchi Offshore	3	4	5	2	-	-	1	-	3	-	1	-
124	Central Chukchi Offshore	-	2	-	-	-	-	2	-	-	-	-	-

Table A.2-2. 10 Days-(Annual ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	2	4	3	1	9	10	3	11	4	22	3	18
1	Kasegaluk Lagoon Area	-	1	-	-	2	1	-	2	-	7	-	-
6	Hanna Shoal	1	-	3	16	1	5	-	-	3	1	26	4
7	Krill Trap	-	-	-	1	-	1	-	-	1	1	1	3
10	Ledyard Bay SPEI Critical Habitat Area	-	1	1	-	11	5	1	13	1	29	-	2

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
11	Wrangel Island 12 nm & Offshore	1	1	-	-	-	-	1	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	5	1	-	10	-	4	-	-
16	Barrow Canyon	-	1	2	2	2	7	1	1	3	4	5	16
18	Murre Rearing and Molting Area	-	3	1	-	5	1	2	7	1	2	-	-
19	Chukchi Spring Lead System	-	-	-	-	6	7	-	6	1	17	1	13
20	East Chukchi Offshore	-	-	-	-	-	-	-	-	-	-	1	1
23	Polar Bear Offshore	-	4	3	1	45	23	3	45	7	50	2	11
30	Beaufort Spring Lead 1	-	-	-	-	-	1	-	-	-	-	-	2
31	Beaufort Spring Lead 2	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	-	-	-	2	-	-	5	-	3	-	-
39	SUA: Pt. Lay - Kasegaluk	-	1	-	-	4	3	1	4	1	27	-	2
40	SUA: Icy Cape - Wainwright	1	3	4	2	10	21	3	6	8	26	5	61
41	SUA: Barrow - Chukchi	-	-	-	-	-	1	-	-	-	-	-	2
42	SUA: Barrow - East Arch	-	-	1	1	-	2	-	-	1	1	2	3
43	SUA: Nuiqsut - Cross Island	-	-	-	-	-	-	-	-	-	-	1	1
46	Wrangel Island 12 nmi Buffer 2	1	-	-	-	-	-	-	-	-	-	-	-
47	Hanna Shoal Walrus Use Area	5	3	9	35	3	19	3	1	10	4	51	25
48	Chukchi Lead System 4	-	1	2	2	11	16	1	11	4	34	5	29
49	Chukchi Spring Lead 1	-	-	-	-	3	1	-	4	-	2	-	-
50	Pt Lay Walrus Offshore	-	2	2	-	17	8	2	16	2	28	-	4
51	Pt Lay Walrus Nearshore	-	1	-	-	4	1	-	4	-	19	-	-
52	Russian Coast Walrus Offshore	-	3	1	-	5	1	2	7	1	3	-	1
53	Chukchi Spring Lead 2	-	-	-	-	12	7	-	13	1	21	-	4
54	Chukchi Spring Lead 3	-	-	1	1	2	7	-	1	2	6	2	19
56	Hanna Shoal Area	2	1	3	12	1	5	1	-	3	1	20	8
57	Skull Cliffs	-	1	1	1	1	4	1	1	2	4	1	11
58	Russian Coast Walrus Nearshore	-	-	-	-	1	-	-	2	-	1	-	-
61	Pt Lay-Barrow BH GW SFF	2	4	6	6	9	18	4	6	9	20	11	35
62	Herald Shoal Polynya 2	2	7	4	1	1	2	7	1	4	1	1	1
63	North Chukchi	1	-	-	-	-	-	-	-	-	-	-	-
64	Peard Bay Area	-	1	2	2	2	6	1	1	3	4	3	13
66	Herald Island	1	-	-	-	-	-	-	-	-	-	-	-
70	North Central Chukchi	3	-	-	1	-	-	-	-	-	-	-	-
74	Offshore Herald Island	2	1	1	1	-	-	1	-	1	-	-	-
82	N Chukotka Nrshr 2	-	1	-	-	-	-	-	-	-	-	-	-
83	N Chukotka Nrshr 3	-	1	-	-	1	-	1	1	-	-	-	-
91	Hope Sea Valley	1	2	1	-	1	-	1	1	1	-	-	-
102	Opilio Crab EFH	-	-	-	-	5	1	-	7	-	3	-	1
103	Saffron Cod EFH	1	4	6	4	22	25	4	28	10	47	10	55
107	Pt Hope Offshore	-	-	-	-	1	-	-	2	-	-	-	-
108	Barrow Feeding Aggregation	-	-	1	1	-	1	-	-	1	1	2	3
116	AK BFT Outer Shelf&Slope 7	-	-	-	-	-	-	-	-	-	-	1	1
117	AK BFT Outer Shelf&Slope 8	-	-	-	-	-	1	-	-	-	-	1	1
118	AK BFT Outer Shelf&Slope 9	-	-	-	1	-	1	-	-	-	-	1	2
119	AK BFT Outer Shelf&Slope 10	-	-	1	2	-	3	-	-	1	1	4	6
120	Russia CH GW Fall 1&2	-	1	-	-	1	-	1	2	-	1	-	-
121	Cape Lisburne - Pt Hope	-	-	-	-	2	-	-	6	-	2	-	-
123	AK Chukchi Offshore	4	5	8	5	1	2	2	1	5	-	4	1
124	Central Chukchi Offshore	2	5	3	1	1	1	5	1	3	1	1	1

Table A.2-3. 30 Days-(Annual ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	17	30	24	17	38	32	28	42	27	47	19	36
1	Kasegaluk Lagoon Area	-	1	1	-	4	2	1	4	1	9	-	1
2	Point Barrow, Plover Islands	-	-	-	1	-	-	-	-	-	-	1	1
3	SUA: Uelen/Russia	-	1	1	-	2	1	1	2	1	1	-	-
4	SUA:Naukan/Russia	-	-	-	-	2	1	-	3	-	1	-	1
6	Hanna Shoal	4	3	7	20	3	9	3	2	7	3	30	9
7	Krill Trap	1	1	1	2	2	3	1	1	2	2	3	4
10	Ledyard Bay SPEI Critical Habitat Area	1	3	2	1	14	7	3	16	2	30	1	3
11	Wrangel Island 12 nm & Offshore	5	4	4	3	2	1	4	2	3	1	2	1
14	Cape Thompson Seabird Colony Area	-	-	-	-	1	-	-	1	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	1	1	-	6	2	1	12	1	5	-	1
16	Barrow Canyon	2	4	5	5	7	12	4	5	7	8	9	20
18	Murre Rearing and Molting Area	2	7	4	2	11	5	5	14	4	7	2	3
19	Chukchi Spring Lead System	-	1	1	1	8	9	1	8	3	19	3	16
20	East Chukchi Offshore	-	-	-	1	-	1	-	-	-	-	1	1
23	Polar Bear Offshore	2	7	7	4	47	28	6	47	11	52	8	18

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
30	Beaufort Spring Lead 1	-	-	-	-	1	2	-	1	1	1	1	4
31	Beaufort Spring Lead 2	-	-	-	-	-	1	-	-	-	1	-	2
38	SUA: Pt. Hope - Cape Lisburne	-	1	1	-	4	2	1	6	1	5	-	1
39	SUA: Pt. Lay - Kasegaluk	-	2	2	1	7	5	2	6	2	29	1	4
40	SUA: Icy Cape - Wainwright	4	8	9	6	18	26	8	14	13	32	10	64
41	SUA: Barrow - Chukchi	-	-	-	-	1	1	-	-	-	1	1	3
42	SUA: Barrow - East Arch	1	1	2	3	1	3	1	1	2	2	4	4
43	SUA: Nuiqsut - Cross Island	-	-	1	1	1	1	-	-	1	-	2	2
46	Wrangel Island 12 nmi Buffer 2	5	2	2	2	1	1	3	-	2	-	2	1
47	Hanna Shoal Walrus Use Area	11	10	16	38	9	24	10	6	17	9	52	30
48	Chukchi Lead System 4	2	3	5	5	14	20	3	13	7	36	10	32
49	Chukchi Spring Lead 1	-	-	-	-	4	2	-	6	-	4	-	1
50	Pt Lay Walrus Offshore	1	5	4	1	19	10	4	19	5	30	2	5
51	Pt Lay Walrus Nearshore	-	1	1	-	5	2	1	6	1	19	-	1
52	Russian Coast Walrus Offshore	3	9	5	2	13	6	7	16	6	9	2	4
53	Chukchi Spring Lead 2	-	1	1	-	14	9	1	15	2	22	1	5
54	Chukchi Spring Lead 3	-	2	2	2	6	10	1	4	4	9	4	21
55	Point Barrow, Plover Islands	-	-	-	1	-	1	-	-	-	-	1	1
56	Hanna Shoal Area	5	3	5	13	3	7	3	2	5	3	21	10
57	Skull Cliffs	1	2	2	2	4	6	2	3	4	6	3	14
58	Russian Coast Walrus Nearshore	1	2	2	1	5	2	2	7	1	3	1	1
59	Ostrov Kolyuchin	-	1	1	-	1	1	1	1	1	1	-	-
61	Pt Lay-Barrow BH GW SFF	6	9	11	9	15	22	9	12	14	24	15	36
62	Herald Shoal Polynya 2	4	11	8	5	4	5	11	4	7	3	4	4
63	North Chukchi	3	-	1	1	-	-	1	-	1	-	-	-
64	Peard Bay Area	2	3	4	3	6	9	4	4	6	8	6	16
66	Herald Island	2	1	1	1	1	1	1	1	1	-	1	-
70	North Central Chukchi	3	-	1	2	-	1	-	-	1	-	1	1
74	Offshore Herald Island	4	2	3	3	1	2	3	1	3	1	3	1
80	Beaufort Outer Shelf 1	-	-	-	1	-	1	-	-	1	-	1	1
82	N Chukotka Nrshr 2	2	4	2	1	3	2	3	3	2	2	1	1
83	N Chukotka Nrshr 3	1	3	2	1	4	2	3	5	2	2	1	1
91	Hope Sea Valley	3	4	3	2	3	2	4	3	4	2	2	2
101	Beaufort Outer Shelf 2	-	-	-	-	-	1	-	-	-	-	1	1
102	Opilio Crab EFH	1	3	2	1	9	4	2	12	2	8	1	3
103	Saffron Cod EFH	6	14	15	12	37	37	14	41	21	58	19	62
107	Pt Hope Offshore	-	-	-	-	2	1	-	3	-	1	-	-
108	Barrow Feeding Aggregation	1	1	1	2	1	2	1	-	1	1	3	4
113	AK BFT Outer Shelf&Slope 4	-	-	-	-	-	-	-	-	-	-	1	1
114	AK BFT Outer Shelf&Slope 5	-	-	-	1	-	-	-	-	-	-	1	1
115	AK BFT Outer Shelf&Slope 6	1	-	1	1	-	1	-	-	1	-	1	1
116	AK BFT Outer Shelf&Slope 7	1	-	1	1	-	1	-	-	1	-	2	2
117	AK BFT Outer Shelf&Slope 8	1	1	1	2	1	2	1	-	1	1	3	3
118	AK BFT Outer Shelf&Slope 9	1	1	1	2	1	2	1	1	1	1	3	3
119	AK BFT Outer Shelf&Slope 10	2	2	3	4	3	6	2	2	4	4	7	9
120	Russia CH GW Fall 1&2	1	3	2	1	4	2	2	5	2	2	1	1
121	Cape Lisburne - Pt Hope	-	1	-	-	3	1	1	7	-	2	-	-
122	North Chukotka Offshore	2	2	2	1	1	1	2	1	2	1	1	1
123	AK Chukchi Offshore	5	5	9	7	2	3	3	2	6	1	6	3
124	Central Chukchi Offshore	4	7	5	4	3	4	7	3	5	3	4	2

Table A.2-4. 60 Days-(Annual ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	28	45	39	29	52	45	43	54	41	59	32	47
1	Kasegaluk Lagoon Area	-	1	1	-	4	2	1	4	1	9	-	1
2	Point Barrow, Plover Islands	-	-	-	1	-	-	-	-	-	-	1	1
3	SUA: Uelen/Russia	1	1	1	-	2	1	1	2	1	1	-	-
4	SUA:Naukan/Russia	-	1	1	-	3	1	1	4	1	2	-	1
6	Hanna Shoal	6	5	8	21	4	10	5	3	8	4	31	11
7	Krill Trap	1	1	2	2	2	3	1	1	2	2	3	5
10	Ledyard Bay SPEI Critical Habitat Area	1	3	2	1	14	7	3	16	3	30	1	3
11	Wrangel Island 12 nm & Offshore	6	5	4	4	2	2	5	2	4	1	3	1
14	Cape Thompson Seabird Colony Area	-	-	-	-	1	-	-	1	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	1	1	-	7	2	1	12	1	6	-	1
16	Barrow Canyon	3	5	6	6	8	13	5	6	8	10	9	21
18	Murre Rearing and Molting Area	2	7	5	3	12	6	6	15	5	8	3	4
19	Chukchi Spring Lead System	-	1	2	1	9	10	1	9	3	20	3	16
20	East Chukchi Offshore	1	-	-	1	-	1	-	-	-	-	2	2

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
23	Polar Bear Offshore	3	9	8	5	47	28	8	47	12	52	9	19
29	AK BFT Bowhead FM 8	-	-	-	-	-	-	-	-	-	-	-	1
30	Beaufort Spring Lead 1	-	-	1	-	1	2	-	1	1	2	1	4
31	Beaufort Spring Lead 2	-	-	-	-	1	1	-	-	-	1	-	2
32	Beaufort Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	1	1	1	4	2	1	7	1	5	-	1
39	SUA: Pt. Lay - Kasegaluk	1	2	2	1	7	5	2	7	2	29	2	4
40	SUA: Icy Cape - Wainwright	4	9	11	7	20	28	9	15	15	34	11	64
41	SUA: Barrow - Chukchi	-	-	-	-	1	1	-	1	1	1	1	3
42	SUA: Barrow - East Arch	2	2	2	3	2	3	2	1	2	2	4	4
43	SUA: Nuiqsut - Cross Island	1	1	1	1	1	1	1	-	1	1	2	2
46	Wrangel Island 12 nmi Buffer 2	8	5	5	5	2	3	6	2	4	2	4	2
47	Hanna Shoal Walrus Use Area	13	13	18	39	12	26	13	9	19	12	53	32
48	Chukchi Lead System 4	2	4	6	7	15	21	4	14	9	37	11	33
49	Chukchi Spring Lead 1	-	1	1	-	5	2	-	6	1	4	1	2
50	Pt Lay Walrus Offshore	1	5	4	1	20	11	5	19	5	30	2	6
51	Pt Lay Walrus Nearshore	-	1	1	-	5	2	1	6	1	20	-	1
52	Russian Coast Walrus Offshore	3	10	6	3	14	7	8	18	6	10	3	5
53	Chukchi Spring Lead 2	-	1	1	1	14	9	1	15	2	22	2	6
54	Chukchi Spring Lead 3	-	2	3	2	7	11	2	5	5	10	5	22
55	Point Barrow, Plover Islands	-	-	-	1	-	1	-	-	-	-	1	1
56	Hanna Shoal Area	6	4	6	14	3	8	4	2	6	3	22	10
57	Skull Cliffs	1	2	3	2	4	7	2	3	4	6	3	15
58	Russian Coast Walrus Nearshore	1	3	2	1	5	2	2	7	2	4	1	1
59	Ostrov Kolyuchin	-	1	1	-	1	1	1	1	1	1	-	-
61	Pt Lay-Barrow BH GW SFF	7	11	12	10	17	23	11	14	15	25	15	36
62	Herald Shoal Polynya 2	5	12	9	6	6	6	12	4	9	5	6	5
63	North Chukchi	3	1	1	1	-	-	1	-	1	-	1	-
64	Peard Bay Area	2	4	5	4	7	10	4	5	7	8	6	16
66	Herald Island	2	1	1	2	1	1	1	1	1	1	1	1
70	North Central Chukchi	3	-	1	2	-	1	-	-	1	-	1	1
74	Offshore Herald Island	5	2	3	3	1	2	3	1	3	1	3	1
80	Beaufort Outer Shelf 1	-	-	1	1	-	1	-	-	1	-	1	2
82	N Chukotka Nrshr 2	2	4	2	1	3	2	3	4	2	2	1	1
83	N Chukotka Nrshr 3	1	4	2	1	4	2	3	5	2	2	1	1
91	Hope Sea Valley	3	4	4	3	3	3	4	3	4	2	3	2
101	Beaufort Outer Shelf 2	-	-	-	1	-	1	-	-	-	-	1	1
102	Opilio Crab EFH	1	3	3	1	10	5	3	13	3	9	2	3
103	Saffron Cod EFH	8	17	18	14	40	40	16	43	23	60	21	63
107	Pt Hope Offshore	-	1	-	-	2	1	-	3	-	1	-	-
108	Barrow Feeding Aggregation	2	1	2	3	1	2	1	-	2	1	3	4
111	AK BFT Outer Shelf&Slope 2	-	-	-	-	-	-	-	-	-	-	1	1
112	AK BFT Outer Shelf&Slope 3	-	-	-	-	-	1	-	-	-	-	1	1
113	AK BFT Outer Shelf&Slope 4	-	-	1	1	-	1	-	-	1	-	1	1
114	AK BFT Outer Shelf&Slope 5	1	-	1	1	-	1	-	-	1	-	1	1
115	AK BFT Outer Shelf&Slope 6	1	1	1	1	-	1	1	-	1	1	2	2
116	AK BFT Outer Shelf&Slope 7	1	1	1	2	1	2	1	-	1	1	2	3
117	AK BFT Outer Shelf&Slope 8	2	1	2	2	1	2	1	1	2	1	3	3
118	AK BFT Outer Shelf&Slope 9	2	1	2	3	2	3	1	1	2	2	4	4
119	AK BFT Outer Shelf&Slope 10	3	3	4	5	4	7	3	4	5	5	7	10
120	Russia CH GW Fall 1&2	1	3	2	1	4	2	2	5	2	2	1	1
121	Cape Lisburne - Pt Hope	-	1	-	-	4	1	1	8	1	3	-	1
122	North Chukotka Offshore	2	2	2	2	1	1	2	1	2	1	1	1
123	AK Chukchi Offshore	5	5	9	8	2	4	3	2	7	2	7	3
124	Central Chukchi Offshore	4	7	5	4	3	4	7	3	5	3	4	3

Table A.2-5. 180 Days-(Annual ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	35	52	46	37	58	52	50	60	49	63	40	54
1	Kasegaluk Lagoon Area	-	1	1	-	4	2	1	4	1	9	-	1
2	Point Barrow, Plover Islands	-	-	1	1	-	1	-	-	-	-	1	1
3	SUA: Uelen/Russia	1	2	1	1	2	1	2	2	1	1	1	-
4	SUA:Naukan/Russia	-	1	1	1	3	2	1	4	1	2	1	1
6	Hanna Shoal	6	7	10	22	6	12	7	4	10	6	32	12
7	Krill Trap	1	2	2	2	2	3	2	2	2	3	3	5
10	Ledyard Bay SPEI Critical Habitat Area	1	3	2	1	14	7	3	16	3	30	1	3
11	Wrangel Island 12 nm & Offshore	6	7	6	5	4	4	7	4	5	3	4	3
14	Cape Thompson Seabird Colony Area	-	-	-	-	1	-	-	1	-	-	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
15	Cape Lisburne Seabird Colony Area	-	1	1	-	7	2	1	12	1	6	1	1
16	Barrow Canyon	3	5	7	6	9	13	6	7	9	10	10	22
18	Murre Rearing and Molting Area	3	8	6	3	13	7	7	16	6	9	4	4
19	Chukchi Spring Lead System	-	2	2	2	10	10	1	10	4	20	3	16
20	East Chukchi Offshore	1	-	1	2	-	1	-	-	1	1	2	2
23	Polar Bear Offshore	3	9	8	5	47	29	8	47	12	53	9	19
29	AK BFT Bowhead FM 8	-	-	-	-	-	-	-	-	-	-	1	1
30	Beaufort Spring Lead 1	-	-	1	1	2	3	-	1	1	2	1	4
31	Beaufort Spring Lead 2	-	-	-	-	1	1	-	1	-	1	1	2
32	Beaufort Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	1	1	1	4	2	1	7	1	5	-	1
39	SUA: Pt. Lay - Kasegaluk	1	2	2	1	7	5	2	7	2	29	2	4
40	SUA: Icy Cape - Wainwright	5	10	11	8	20	28	10	16	15	35	12	65
41	SUA: Barrow - Chukchi	-	-	-	-	1	2	-	1	1	1	1	3
42	SUA: Barrow - East Arch	2	3	3	4	3	4	3	2	3	3	5	5
43	SUA: Nuiqsut - Cross Island	1	1	1	1	1	2	1	1	2	1	2	2
44	SUA: Kaktovik	-	-	-	-	-	-	-	-	-	-	1	1
46	Wrangel Island 12 nmi Buffer 2	9	6	6	7	3	4	6	2	6	2	5	3
47	Hanna Shoal Walrus Use Area	14	15	20	40	14	28	15	11	22	14	55	34
48	Chukchi Lead System 4	3	4	6	7	15	21	4	14	9	37	11	33
49	Chukchi Spring Lead 1	-	1	1	1	5	2	-	6	1	4	1	2
50	Pt Lay Walrus Offshore	2	5	4	2	20	11	5	20	5	30	2	6
51	Pt Lay Walrus Nearshore	-	2	1	-	5	2	1	6	1	20	-	1
52	Russian Coast Walrus Offshore	4	10	7	4	15	8	9	18	7	10	4	5
53	Chukchi Spring Lead 2	-	1	1	1	14	9	1	15	2	23	2	6
54	Chukchi Spring Lead 3	-	3	3	2	7	11	2	6	5	11	5	22
55	Point Barrow, Plover Islands	-	-	1	1	-	1	-	-	1	1	2	2
56	Hanna Shoal Area	6	6	8	15	5	9	6	4	8	5	24	12
57	Skull Cliffs	2	2	3	2	4	7	2	3	4	6	4	15
58	Russian Coast Walrus Nearshore	1	3	2	1	6	3	3	7	3	4	1	1
59	Ostrov Kolyuchin	-	1	1	-	1	1	1	1	1	1	-	-
61	Pt Lay-Barrow BH GW SFF	7	12	13	10	18	24	12	15	16	26	16	37
62	Herald Shoal Polynya 2	6	12	10	7	6	7	12	5	9	5	6	6
63	North Chukchi	3	1	1	2	-	1	1	-	1	-	1	1
64	Peard Bay Area	3	5	5	4	7	10	5	6	7	9	6	16
66	Herald Island	2	2	2	2	1	1	2	1	2	1	2	1
70	North Central Chukchi	4	1	1	3	1	1	1	1	1	1	2	1
74	Offshore Herald Island	5	3	3	4	1	2	3	1	3	1	3	2
80	Beaufort Outer Shelf 1	1	1	1	1	1	1	1	1	1	1	2	2
82	N Chukotka Nrshr 2	2	4	2	1	3	2	4	4	2	2	1	1
83	N Chukotka Nrshr 3	2	4	3	2	4	2	3	5	3	3	1	1
91	Hope Sea Valley	3	4	4	3	3	3	4	3	4	2	3	2
101	Beaufort Outer Shelf 2	1	1	1	1	1	1	1	-	1	1	1	1
102	Opilio Crab EFH	1	3	3	1	10	5	3	13	3	9	2	4
103	Saffron Cod EFH	9	18	19	15	41	41	17	44	24	61	23	64
107	Pt Hope Offshore	-	1	-	-	2	1	-	3	-	1	-	-
108	Barrow Feeding Aggregation	2	1	2	3	1	3	1	1	2	1	4	4
110	AK BFT Outer Shelf&Slope 1	-	-	-	-	-	1	-	-	1	1	1	1
111	AK BFT Outer Shelf&Slope 2	1	1	1	1	1	1	1	-	1	1	1	1
112	AK BFT Outer Shelf&Slope 3	1	1	1	1	1	1	1	1	1	1	1	1
113	AK BFT Outer Shelf&Slope 4	1	1	1	1	1	1	1	1	1	1	1	1
114	AK BFT Outer Shelf&Slope 5	1	1	1	1	1	1	1	1	1	1	1	1
115	AK BFT Outer Shelf&Slope 6	1	1	1	1	1	2	1	1	2	1	2	2
116	AK BFT Outer Shelf&Slope 7	1	2	2	2	1	2	2	1	2	1	3	3
117	AK BFT Outer Shelf&Slope 8	2	2	2	3	2	3	2	2	3	2	4	4
118	AK BFT Outer Shelf&Slope 9	2	2	3	3	3	4	2	2	3	3	4	5
119	AK BFT Outer Shelf&Slope 10	4	5	5	5	6	8	5	5	6	6	8	10
120	Russia CH GW Fall 1&2	1	3	2	1	4	2	3	5	2	3	1	1
121	Cape Lisburne - Pt Hope	-	1	1	-	4	1	1	8	1	3	-	1
122	North Chukotka Offshore	2	2	2	2	1	1	3	1	2	1	1	1
123	AK Chukchi Offshore	5	5	9	8	2	4	3	2	7	2	7	3
124	Central Chukchi Offshore	4	7	6	4	3	4	7	3	5	3	4	3

Table A.2-6. 360 Days-(Annual ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	35	52	46	37	58	52	51	60	49	64	40	54
1	Kasegaluk Lagoon Area	-	1	1	-	4	2	1	4	1	9	-	1
2	Point Barrow, Plover Islands	-	-	1	1	-	1	-	-	-	-	1	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
3	SUA: Uelen/Russia	1	2	1	1	2	1	2	2	1	1	1	-
4	SUA:Naukan/Russia	-	1	1	1	3	2	1	4	1	2	1	1
6	Hanna Shoal	6	7	10	22	6	12	7	5	10	6	33	12
7	Krill Trap	1	2	2	2	2	3	2	2	2	3	3	5
10	Ledyard Bay SPEI Critical Habitat Area	1	3	2	1	14	7	3	16	3	30	1	3
11	Wrangel Island 12 nm & Offshore	6	7	6	5	4	4	7	4	5	3	4	3
14	Cape Thompson Seabird Colony Area	-	-	-	-	1	-	-	1	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	1	1	-	7	2	1	12	1	6	1	1
16	Barrow Canyon	3	5	7	6	9	13	6	7	9	10	10	22
18	Murre Rearing and Molting Area	3	8	6	3	13	7	7	16	6	9	4	4
19	Chukchi Spring Lead System	-	2	2	2	10	10	1	10	4	20	3	16
20	East Chukchi Offshore	1	-	1	2	-	1	-	-	1	1	2	3
23	Polar Bear Offshore	3	9	8	5	47	29	8	47	12	53	9	19
29	AK BFT Bowhead FM 8	-	-	-	-	-	-	-	-	-	-	1	1
30	Beaufort Spring Lead 1	-	-	1	1	2	3	-	1	1	2	1	4
31	Beaufort Spring Lead 2	-	-	-	-	1	1	-	1	-	1	1	2
32	Beaufort Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	1	1	1	4	2	1	7	1	5	-	1
39	SUA: Pt. Lay - Kasegaluk	1	2	2	1	7	5	2	7	2	29	2	4
40	SUA: Icy Cape - Wainwright	5	10	11	8	20	28	10	16	15	35	12	65
41	SUA: Barrow - Chukchi	-	-	-	-	1	2	-	1	1	1	1	3
42	SUA: Barrow - East Arch	2	3	3	4	3	4	3	2	3	3	5	5
43	SUA: Nuiqsut - Cross Island	1	1	1	1	1	2	1	1	2	1	2	2
44	SUA: Kaktovik	-	-	-	-	-	1	-	-	-	-	1	1
46	Wrangel Island 12 nmi Buffer 2	9	6	6	7	3	4	7	2	6	2	5	3
47	Hanna Shoal Walrus Use Area	14	15	20	40	14	28	15	11	22	14	55	34
48	Chukchi Lead System 4	3	4	6	7	15	21	4	14	9	37	11	33
49	Chukchi Spring Lead 1	-	1	1	1	5	2	-	6	1	4	1	2
50	Pt Lay Walrus Offshore	2	5	4	2	20	11	5	20	5	30	2	6
51	Pt Lay Walrus Nearshore	-	2	1	-	5	2	1	6	1	20	-	1
52	Russian Coast Walrus Offshore	4	10	7	4	15	8	9	18	7	10	4	5
53	Chukchi Spring Lead 2	-	1	1	1	14	9	1	15	2	23	2	6
54	Chukchi Spring Lead 3	-	3	3	2	7	11	2	6	5	11	5	22
55	Point Barrow, Plover Islands	-	-	1	1	-	1	-	-	1	1	2	2
56	Hanna Shoal Area	6	6	8	15	5	9	6	4	8	5	24	12
57	Skull Cliffs	2	2	3	2	4	7	2	3	4	6	4	15
58	Russian Coast Walrus Nearshore	1	3	2	1	6	3	3	7	3	4	1	1
59	Ostrov Kolyuchin	-	1	1	-	1	1	1	1	1	1	-	-
61	Pt Lay-Barrow BH GW SFF	7	12	13	10	18	24	12	15	16	26	16	37
62	Herald Shoal Polynya 2	6	12	10	7	6	7	12	5	9	5	6	6
63	North Chukchi	3	1	1	2	-	1	1	-	1	-	1	1
64	Peard Bay Area	3	5	5	4	7	10	5	6	7	9	6	16
66	Herald Island	2	2	2	2	1	1	2	1	2	1	2	1
70	North Central Chukchi	4	1	1	3	1	1	1	1	1	1	2	1
74	Offshore Herald Island	5	3	3	4	1	2	3	1	3	1	3	2
80	Beaufort Outer Shelf 1	1	1	1	1	1	1	1	1	1	1	2	2
82	N Chukotka Nrshr 2	2	4	2	1	3	2	4	4	2	2	1	1
83	N Chukotka Nrshr 3	2	4	3	2	4	2	3	5	3	3	1	1
91	Hope Sea Valley	3	4	4	3	3	3	4	3	4	2	3	2
101	Beaufort Outer Shelf 2	1	1	1	1	1	1	1	-	1	1	1	1
102	Opilio Crab EFH	1	3	3	1	10	5	3	13	3	9	2	4
103	Saffron Cod EFH	9	18	19	15	41	41	17	44	24	61	23	64
107	Pt Hope Offshore	-	1	-	-	2	1	-	3	-	1	-	-
108	Barrow Feeding Aggregation	2	1	2	3	1	3	1	1	2	1	4	4
110	AK BFT Outer Shelf&Slope 1	-	-	-	-	-	1	-	-	1	1	1	1
111	AK BFT Outer Shelf&Slope 2	1	1	1	1	1	1	1	-	1	1	1	1
112	AK BFT Outer Shelf&Slope 3	1	1	1	1	1	1	1	1	1	1	1	1
113	AK BFT Outer Shelf&Slope 4	1	1	1	1	1	1	1	1	1	1	1	1
114	AK BFT Outer Shelf&Slope 5	1	1	1	1	1	1	1	1	1	1	1	1
115	AK BFT Outer Shelf&Slope 6	1	1	1	1	1	2	1	1	2	1	2	2
116	AK BFT Outer Shelf&Slope 7	1	2	2	2	1	2	2	1	2	1	3	3
117	AK BFT Outer Shelf&Slope 8	2	2	2	3	2	3	2	2	3	2	4	4
118	AK BFT Outer Shelf&Slope 9	2	2	3	3	3	4	2	2	3	3	4	5
119	AK BFT Outer Shelf&Slope 10	4	5	5	5	6	8	5	5	6	6	8	10
120	Russia CH GW Fall 1&2	1	3	2	1	4	2	3	5	2	3	1	1
121	Cape Lisburne - Pt Hope	-	1	1	-	4	1	1	8	1	3	-	1
122	North Chukotka Offshore	2	2	2	2	1	1	3	1	2	1	1	1
123	AK Chukchi Offshore	5	5	9	8	2	4	3	2	7	2	7	3
124	Central Chukchi Offshore	4	7	6	4	3	4	7	3	5	3	4	3

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

Tables A.2-7 through A.2-12 represent annual conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain land segment:

Table A.2-7. 3 Days-(Annual LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	1	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	2	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	2	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	1	-	-
75	Akeonik, Icy Cape	-	-	-	-	-	-	-	-	-	1	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	-	2
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	-	2
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	-	-	-	-	-	1
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	-	-	-	-	-	1

Table A.2-8. 10 Days-(Annual LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	1	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	1	-	-	2	-	1	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	2	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	-	-	-	-	2	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	-	-	2	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	1	-	1
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	-	1	-	-	-	1	-	1
79	Point Belcher, Wainwright	-	-	-	-	1	2	-	-	1	2	-	3
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	1	-	-	-	1	-	3
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	1	-	-	-	1	1	3
85	Barrow, Browerville, Elson Lag.	-	-	1	1	1	2	-	-	1	1	1	4

Table A.2-9. 30 Days-(Annual LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
5	Mys Evans	1	-	-	-	-	-	-	-	-	-	-	-
6	Ostrov Mushtakova	1	1	1	1	-	-	1	-	-	-	-	-
7	Kosa Bruch	1	1	1	1	-	-	1	-	1	-	1	-
8	E. Wrangel Island, Skeletov	1	1	1	1	-	-	1	-	1	-	1	-
20	Polyarnyy, Pil'gyn	-	-	-	-	-	-	1	-	-	-	-	-
21	Laguna Pil'khikay, Pil'khikay	-	1	-	-	-	-	1	-	1	-	-	-
22	Rypkarpyy, Mys Shmidta	1	1	1	-	-	-	1	-	1	-	-	-
23	Emuem, Tenkergin	-	1	1	-	-	-	1	-	1	-	-	-
24	LS 24	1	1	1	-	1	-	1	1	1	-	-	-
25	Laguna Amguema, Yulinu	1	1	1	-	1	1	1	1	1	-	-	-
26	Ekugvaam, Kepin, Pil'khin	1	1	1	1	1	1	1	1	1	1	-	-
27	Laguna Nut, Rigol'	1	1	1	1	1	1	1	1	1	1	1	1
28	Vankarem,Vankarem Laguna	1	2	1	1	1	1	1	1	1	1	1	1
29	Mys Onman, Vel'may	-	1	1	1	1	1	1	1	1	1	1	1
30	Nutepynmin, Pyngopil'gyn	1	2	1	1	2	1	1	2	1	1	1	1
31	Alyatki, Zaliv Tasytkhin	1	2	1	1	2	1	2	3	1	2	1	1
32	Mys Dzhenretlen, Eynenekvyk	-	1	1	-	2	1	1	2	1	1	-	1
33	Neskan, Laguna Neskan	-	1	1	-	1	1	1	2	1	1	-	1
34	Tepken, Memino	-	1	1	-	1	1	1	2	1	1	-	1
35	Enurmino, Mys Neten	-	1	-	-	2	1	1	2	1	1	-	1
36	Mys Serdtse-Kamen	-	1	-	-	1	1	-	2	-	1	-	1
37	Chegitun, Utkan	-	-	-	-	1	-	-	1	-	1	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	1	-	-	1	-	1	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	1	-	-	1	-	1	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	1	1	-	3	-	2	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	1	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	1	-	-	1	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	-	-	1	-	3	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	1	-	1	-	3	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	1	-	2	-	1
76	Avak Inlet, Tunalik River	-	-	-	-	-	1	-	-	-	1	-	1
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	1	1	1	1	1	2	-	1
79	Point Belcher, Wainwright	-	1	1	1	2	2	1	1	1	3	1	4
80	Eluksingiak Point, Kugrua Bay	-	-	1	-	1	2	-	1	1	2	-	4
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	1	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	1	1	1	1	2	1	1	1	2	1	4
85	Barrow, Browerville, Elson Lag.	1	1	2	2	2	4	1	1	2	2	3	6

Table A.2-10. 60 Days-(Annual LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
5	Mys Evans	1	-	1	1	-	-	1	-	-	-	-	-
6	Ostrov Mushtakova	2	1	1	1	-	-	1	-	1	-	1	-
7	Kosa Bruch	2	1	1	1	-	1	1	-	1	-	1	1
8	E. Wrangel Island, Skeletov	2	1	1	1	1	1	2	-	1	-	1	1
9	Mys Proletarskiy	1	1	1	-	-	-	1	-	-	-	-	-
19	Laguna Kuepil'khin, Leningradskiy	1	1	1	-	-	-	-	-	-	-	-	-
20	Polyarnyy, Pil'gyn	1	1	1	1	-	-	1	-	1	-	1	-
21	Laguna Pil'khikay, Pil'khikay	1	1	1	1	1	-	1	-	1	-	1	-
22	Rypkarpyy, Mys Shmidta	1	1	1	1	1	1	1	1	1	1	1	-
23	Emuem, Tenkergin	1	1	1	1	1	1	1	1	1	1	1	-
24	LS 24	1	1	1	1	1	1	1	1	1	1	1	-
25	Laguna Amguema, Yulinu	1	2	1	1	1	1	2	1	1	1	1	1
26	Ekugvaam, Kepin, Pil'khin	1	2	1	1	1	1	2	1	1	1	1	1
27	Laguna Nut, Rigol'	1	2	2	1	1	1	2	1	2	1	1	1
28	Vankarem,Vankarem Laguna	1	2	2	1	2	1	2	2	2	1	1	1
29	Mys Onman, Vel'may	1	2	1	1	2	1	2	2	2	1	1	1
30	Nutepynmin, Pyngopil'gyn	1	2	2	1	3	2	2	3	2	2	2	1
31	Alyatki, Zaliv Tasytkhin	1	3	2	1	3	2	2	3	2	2	2	2
32	Mys Dzhenretlen, Eynenekvyk	1	2	1	1	2	2	2	2	1	2	1	1
33	Neskan, Laguna Neskan	1	2	1	1	2	1	2	2	1	2	1	1
34	Tepken, Memino	-	2	1	-	2	1	1	2	1	1	1	1
35	Enurmino, Mys Neten	-	1	1	-	2	1	1	2	1	2	-	1
36	Mys Serdtse-Kamen	-	1	1	-	2	1	1	3	1	2	-	1
37	Chegitun, Utkan	-	1	-	-	2	1	1	2	-	1	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	1	1	-	1	-	1	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	1	1	-	1	-	1	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	2	1	-	3	-	2	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	1	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	1	-	-	1	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	-	-	1	-	3	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	1	-	1	-	3	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	1	-	2	-	1
76	Avak Inlet, Tunalik River	-	-	-	-	-	1	-	-	-	1	-	1
77	Nivat Point, Nokotlek Point	-	-	-	-	-	1	-	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	1	1	-	1	1	1	1	1	2	-	1
79	Point Belcher, Wainwright	1	1	1	1	2	3	1	1	2	3	1	4
80	Eluksingiak Point, Kugrua Bay	-	1	1	1	1	2	1	1	1	2	-	4
81	Peard Bay, Point Franklin	-	-	-	-	-	1	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	1	-	-	-	-	1	1
84	Will Rogers & Wiley Post Mem.	-	1	1	1	1	2	1	1	1	2	2	4
85	Barrow, Browerville, Elson Lag.	1	1	2	2	2	4	1	2	3	3	3	6

Table A.2-11. 180 Days-(Annual LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
3	Mys Florens, Gusinaya	1	-	-	-	-	-	-	-	-	-	-	-
4	Mys Ushakova, Laguna Drem-Khed	1	-	-	-	-	-	-	-	-	-	-	-
5	Mys Evans	1	1	1	1	-	-	1	-	1	-	1	-
6	Ostrov Mushtakova	2	1	1	1	-	1	1	-	1	1	1	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
7	Kosa Bruch	2	1	2	1	1	1	2	1	1	1	1	1
8	E. Wrangel Island, Skeletov	2	2	2	2	1	1	2	1	2	1	2	1
9	Mys Proletarskiy	1	1	1	1	1	1	1	-	1	-	1	-
10	Bukhta Davidova	1	1	1	-	-	-	1	-	-	-	-	-
19	Laguna Kuepil'khin, Leningradskiy	1	1	1	1	-	-	1	-	-	-	-	-
20	Polyarnyy, Pil'gyn	1	1	1	1	-	-	1	-	1	-	1	-
21	Laguna Pil'khikay, Pil'khikay	1	1	1	1	1	1	1	1	1	-	1	-
22	Rypkarpyy, Mys Shmidta	1	1	1	1	1	1	2	1	1	1	1	1
23	Emuem, Tenkergin	1	1	1	1	1	1	1	1	1	1	1	-
24	LS 24	1	2	1	1	1	1	2	1	1	1	1	1
25	Laguna Amguema, Yulinu	1	2	2	1	1	1	2	1	1	1	1	1
26	Ekugvaam, Kepin, Pil'khin	1	2	2	1	1	1	2	1	1	1	1	1
27	Laguna Nut, Rigol'	1	2	2	1	2	1	2	2	2	1	1	1
28	Vankarem,Vankarem Laguna	1	2	2	1	2	2	2	2	2	1	1	1
29	Mys Onman, Vel'may	1	2	2	1	2	2	2	2	2	2	1	1
30	Nutepynmin, Pyngopil'gyn	1	3	2	1	3	2	2	3	2	2	2	1
31	Alyatki, Zaliv Tasytkhin	1	3	2	1	3	2	3	4	2	3	2	2
32	Mys Dzhenretlen, Eynenekvyk	1	2	2	1	2	2	2	3	2	2	1	2
33	Neskan, Laguna Neskan	1	2	2	1	2	1	2	2	2	2	1	1
34	Tepken, Memino	1	2	1	1	2	1	2	3	2	2	1	1
35	Enurmino, Mys Neten	1	2	1	1	2	1	2	3	1	2	1	1
36	Mys Serdtse-Kamen	1	1	1	1	2	1	1	3	1	2	1	1
37	Chegitun, Utkan	-	1	1	-	2	1	1	2	1	1	-	1
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	1	1	-	1	-	1	-	1
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	1	1	-	1	-	1	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	2	1	-	3	-	2	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	1	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	1	-	-	1	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	-	-	1	-	3	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	1	-	1	-	3	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	1	-	2	-	1
76	Avak Inlet, Tunalik River	-	-	-	-	-	1	-	-	-	1	-	1
77	Nivat Point, Nokotlek Point	-	-	-	-	-	1	-	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	1	1	-	1	1	1	1	1	2	-	1
79	Point Belcher, Wainwright	1	1	1	1	2	3	1	1	2	4	1	4
80	Eluksingiak Point, Kugrua Bay	-	1	1	1	1	2	1	1	1	2	1	4
81	Peard Bay, Point Franklin	-	-	-	-	-	1	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	1	-	-	1	-	1	1
84	Will Rogers & Wiley Post Mem.	1	1	1	1	1	2	1	1	1	2	2	4
85	Barrow, Browerville, Elson Lag.	1	2	2	2	2	4	2	2	3	3	4	7
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	-	-	-	-	1	-

Table A.2-12. 360 Days-(Annual LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
3	Mys Florens, Gusinaya	1	-	-	-	-	-	-	-	-	-	-	-
4	Mys Ushakova, Laguna Drem-Khed	1	-	-	-	-	-	-	-	-	-	-	-
5	Mys Evans	1	1	1	1	-	-	1	-	1	-	1	-
6	Ostrov Mushtakova	2	1	1	1	-	1	1	-	1	1	1	1
7	Kosa Bruch	2	1	2	1	1	1	2	1	1	1	1	1
8	E. Wrangel Island, Skeletov	2	2	2	2	1	1	2	1	2	1	2	1
9	Mys Proletarskiy	1	1	1	1	1	1	1	-	1	-	1	1
10	Bukhta Davidova	1	1	1	-	-	-	1	-	-	-	-	-
19	Laguna Kuepil'khin, Leningradskiy	1	1	1	1	-	-	1	-	1	-	-	-
20	Polyarnyy, Pil'gyn	1	1	1	1	-	-	1	-	1	-	1	-
21	Laguna Pil'khikay, Pil'khikay	1	1	1	1	1	1	1	1	1	-	1	-
22	Rypkarpyy, Mys Shmidta	1	1	1	1	1	1	2	1	1	1	1	1
23	Emuem, Tenkergin	1	1	1	1	1	1	1	1	1	1	1	-
24	LS 24	1	2	1	1	1	1	2	1	1	1	1	1
25	Laguna Amguema, Yulinu	1	2	2	1	1	1	2	1	1	1	1	1
26	Ekugvaam, Kepin, Pil'khin	1	2	2	1	1	1	2	1	1	1	1	1
27	Laguna Nut, Rigol'	1	2	2	1	2	1	2	2	2	1	1	1
28	Vankarem,Vankarem Laguna	1	2	2	1	2	2	2	2	2	1	1	1
29	Mys Onman, Vel'may	1	2	2	1	2	2	2	2	2	2	1	1
30	Nutepynmin, Pyngopil'gyn	1	3	2	1	3	2	2	3	2	2	2	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
31	Alyatki, Zaliv Tasytkhin	1	3	2	1	3	2	3	4	2	3	2	2
32	Mys Dzhenretlen, Eynenekvyk	1	2	2	1	2	2	2	3	2	2	1	2
33	Neskan, Laguna Neskan	1	2	2	1	2	1	2	2	2	2	1	1
34	Tepken, Memino	1	2	1	1	2	1	2	3	2	2	1	1
35	Enurmino, Mys Neten	1	2	1	1	2	1	2	3	1	2	1	1
36	Mys Serdtse-Kamen	1	1	1	1	2	1	1	3	1	2	1	1
37	Chegitun, Utkan	-	1	1	-	2	1	1	2	1	1	-	1
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	1	1	-	1	-	1	-	1
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	1	1	-	1	-	1	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	2	1	-	3	-	2	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	1	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	1	-	-	1	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	-	-	1	-	3	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	1	-	1	-	3	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	1	-	2	-	1
76	Avak Inlet, Tunalik River	-	-	-	-	-	1	-	-	-	1	-	1
77	Nivat Point, Nokotlek Point	-	-	-	-	-	1	-	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	1	1	-	1	1	1	1	1	2	-	1
79	Point Belcher, Wainwright	1	1	1	1	2	3	1	1	2	4	1	4
80	Eluksingiak Point, Kugrua Bay	-	1	1	1	1	2	1	1	1	2	1	4
81	Peard Bay, Point Franklin	-	-	-	-	-	1	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	1	-	-	1	-	1	1
84	Will Rogers & Wiley Post Mem.	1	1	1	1	1	2	1	1	1	2	2	4
85	Barrow, Browerville, Elson Lag.	1	2	2	2	2	4	2	2	3	3	4	7
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	-	-	-	-	1	-

Tables A.2-13 through A.2-18 represent annual conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain group of land segments within:

Table A.2-13. 3 Days-(Annual GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
144	Alaska Maritime Wildlife Refuge	-	-	-	-	-	-	-	1	-	-	-	-
145	Cape Lisburne	-	-	-	-	-	-	-	1	-	-	-	-
146	Ledyard Bay	-	-	-	-	-	-	-	1	-	-	-	-
147	Point Lay Haulout	-	-	-	-	-	-	-	-	-	5	-	-
148	Kasegaluk Brown Bears	-	-	-	-	-	-	-	-	-	3	-	-
149	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	-	3
151	Kuk River	-	-	-	-	-	-	-	-	-	1	-	2
152	TCH Insect Relief/Calving	-	-	-	-	-	-	-	-	-	-	-	1
176	United States Chukchi Coast	-	-	-	-	-	1	-	2	-	7	-	6
177	United States Beaufort Coast	-	-	-	-	-	-	-	-	-	-	-	1

Table A.2-14. 10 Days-(Annual GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	1	-	-	-	-	-	-	-	-	-	-	-
143	WAH Insect Relief	-	-	-	-	-	-	-	1	-	-	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	-	-	2	-	1	-	-
145	Cape Lisburne	-	-	-	-	1	-	-	1	-	1	-	-
146	Ledyard Bay	-	-	-	-	1	-	-	2	-	1	-	-
147	Point Lay Haulout	-	-	-	-	2	1	-	2	-	7	-	-
148	Kasegaluk Brown Bears	-	-	-	-	2	1	-	1	-	5	-	-
149	National Petroleum Reserve Alaska	-	-	1	-	1	2	-	1	1	3	1	6
150	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	1	-	-	-	1	-	1
151	Kuk River	-	1	1	-	1	2	1	1	1	3	-	3
152	TCH Insect Relief/Calving	-	-	-	-	-	1	-	-	1	1	-	2
174	Russia Chukchi Coast Marine Mammals	1	1	-	-	1	-	1	2	-	-	-	-
175	Russia Chukchi Coast	1	2	1	-	2	-	2	3	1	1	-	-
176	United States Chukchi Coast	-	2	2	1	7	7	1	8	3	20	1	13
177	United States Beaufort Coast	-	-	1	1	1	2	-	-	1	1	1	4

Table A.2-15. 30 Days-(Annual GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	3	2	2	1	1	1	2	1	1	-	1	-
135	Kolyuchin Bay	1	2	1	-	2	1	2	3	1	1	1	1
136	Ostrov Idlidlya	-	1	-	-	1	-	1	1	1	1	-	-
137	Mys Serditse Kamen	-	-	-	-	1	-	-	1	-	1	-	-
138	Chukota Coast Haulout	-	1	1	-	2	1	1	3	1	2	1	1
143	WAH Insect Relief	-	-	-	-	1	-	-	2	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	1	-	3	-	2	-	-
145	Cape Lisburne	-	-	-	-	1	-	-	2	-	1	-	-
146	Ledyard Bay	-	-	-	-	2	1	-	3	-	2	-	-
147	Point Lay Haulout	-	1	1	-	3	1	1	3	1	9	-	1
148	Kasegaluk Brown Bears	-	1	1	-	3	2	1	2	1	6	-	1
149	National Petroleum Reserve Alaska	1	1	2	2	3	5	1	2	3	5	3	9
150	Kasegaluk Lagoon Special Use Area	-	-	-	-	1	1	-	1	-	2	-	1
151	Kuk River	1	1	1	1	3	3	1	2	2	5	1	4
152	TCH Insect Relief/Calving	-	1	1	1	1	2	1	1	1	2	1	3
174	Russia Chukchi Coast Marine Mammals	8	12	9	6	10	7	11	12	8	7	6	5
175	Russia Chukchi Coast	15	24	17	11	22	14	22	25	16	16	11	10
176	United States Chukchi Coast	2	5	5	3	14	14	5	15	8	28	5	19
177	United States Beaufort Coast	1	1	2	2	2	4	1	1	3	3	4	7

Table A.2-16. 60 Days-(Annual GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	3	2	2	2	1	1	3	1	2	1	2	1
135	Kolyuchin Bay	1	2	1	1	2	1	2	3	1	1	1	1
136	Ostrov Idlidlya	-	1	1	-	1	-	1	1	1	1	-	-
137	Mys Serditse Kamen	-	-	-	-	1	-	-	1	-	1	-	-
138	Chukota Coast Haulout	1	1	1	1	3	2	1	3	1	2	1	1
143	WAH Insect Relief	-	-	-	-	1	-	-	2	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	1	-	3	-	2	-	-
145	Cape Lisburne	-	-	-	-	1	-	-	2	-	1	-	-
146	Ledyard Bay	-	1	-	-	2	1	-	3	-	2	-	-
147	Point Lay Haulout	-	1	1	-	3	1	1	3	1	9	1	1
148	Kasegaluk Brown Bears	-	1	1	1	3	2	1	2	1	6	-	1
149	National Petroleum Reserve Alaska	1	2	2	2	3	5	2	2	3	5	3	10
150	Kasegaluk Lagoon Special Use Area	-	1	-	-	1	1	-	1	1	2	-	1
151	Kuk River	1	2	2	1	3	3	1	2	2	5	1	4
152	TCH Insect Relief/Calving	-	1	1	1	1	2	1	1	1	2	1	3
174	Russia Chukchi Coast Marine Mammals	12	16	13	10	14	10	15	15	12	10	9	7
175	Russia Chukchi Coast	25	38	30	23	34	26	36	37	30	26	22	20
176	United States Chukchi Coast	3	6	6	4	15	15	6	16	9	29	6	20
177	United States Beaufort Coast	1	2	2	3	3	5	1	2	3	3	5	7

Table A.2-17. 180 Days-(Annual GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	4	4	4	3	3	3	5	3	4	2	3	2
135	Kolyuchin Bay	1	2	1	1	2	1	2	3	1	1	1	1
136	Ostrov Idlidlya	-	1	1	-	1	1	1	1	1	1	-	-
137	Mys Serditse Kamen	-	-	-	-	1	-	-	1	-	1	-	-
138	Chukota Coast Haulout	1	2	1	1	3	2	2	3	2	3	1	2
143	WAH Insect Relief	-	-	-	-	1	-	-	2	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	1	-	3	-	2	-	-
145	Cape Lisburne	-	-	-	-	1	-	-	2	-	1	-	-
146	Ledyard Bay	-	1	-	-	2	1	1	3	-	2	-	-
147	Point Lay Haulout	-	1	1	-	3	1	1	3	1	9	1	1
148	Kasegaluk Brown Bears	-	1	1	1	3	2	1	2	1	6	1	1
149	National Petroleum Reserve Alaska	1	2	3	2	3	5	2	2	3	5	4	10
150	Kasegaluk Lagoon Special Use Area	-	1	-	-	1	1	-	1	1	2	-	1
151	Kuk River	1	2	2	1	3	3	1	2	2	5	1	5
152	TCH Insect Relief/Calving	1	1	1	1	2	2	1	1	2	2	1	3
174	Russia Chukchi Coast Marine Mammals	15	19	17	13	17	14	19	17	16	13	13	11
175	Russia Chukchi Coast	31	44	38	30	40	33	43	42	37	31	29	26
176	United States Chukchi Coast	3	7	7	5	16	15	6	16	9	30	7	21
177	United States Beaufort Coast	1	2	3	3	3	5	2	2	4	3	5	8

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-18. 360 Days-(Annual GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	4	5	4	3	3	3	5	3	4	2	3	2
135	Kolyuchin Bay	1	2	1	1	2	1	2	3	1	1	1	1
136	Ostrov Idlidlya	-	1	1	-	1	1	1	1	1	1	-	-
137	Mys Serditse Kamen	-	-	-	-	1	-	-	1	-	1	-	-
138	Chukota Coast Haulout	1	2	1	1	3	2	2	3	2	3	1	2
143	WAH Insect Relief	-	-	-	-	1	-	-	2	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	1	-	3	-	2	-	-
145	Cape Lisburne	-	-	-	-	1	-	-	2	-	1	-	-
146	Ledyard Bay	-	1	-	-	2	1	1	3	-	2	-	-
147	Point Lay Haulout	-	1	1	-	3	1	1	3	1	9	1	1
148	Kasegaluk Brown Bears	-	1	1	1	3	2	1	2	1	6	1	1
149	National Petroleum Reserve Alaska	1	2	3	2	3	5	2	2	3	5	4	10
150	Kasegaluk Lagoon Special Use Area	-	1	-	-	1	1	-	1	1	2	-	1
151	Kuk River	1	2	2	1	3	3	1	2	2	5	1	5
152	TCH Insect Relief/Calving	1	1	1	1	2	2	1	1	2	2	1	3
174	Russia Chukchi Coast Marine Mammals	15	19	17	14	17	14	19	18	16	13	13	11
175	Russia Chukchi Coast	31	44	38	30	40	33	43	42	37	31	29	26
176	United States Chukchi Coast	3	7	7	5	16	15	6	16	9	30	7	21
177	United States Beaufort Coast	1	2	3	3	3	5	2	2	4	3	5	8

Tables A.2-19 through A.2-24 represent annual conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain boundary segment within:

Table A.2-19. 3 Days-(Annual BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9

Note: All rows have all values less than 0.5 percent and are not shown

Table A.2-20. 10 Days-(Annual BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9

Note: All rows have all values less than 0.5 percent and are not shown

Table A.2-21. 30 Days-(Annual BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
2	Bering Strait	-	-	-	-	-	-	-	1	-	-	-	-
3	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
4	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
5	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
6	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
7	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
17	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
18	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	1
19	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-

Table A.2-22. 60 Days-(Annual BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Bering Strait	-	-	-	-	1	-	-	1	-	-	-	-
2	Bering Strait	-	-	-	-	1	-	-	1	-	1	-	-
3	Chukchi Sea	1	1	1	1	-	-	1	-	1	-	1	-
4	Chukchi Sea	2	1	1	1	-	-	1	-	1	-	1	-
5	Chukchi Sea	3	1	1	1	-	-	1	-	1	-	1	-
6	Chukchi Sea	3	1	1	2	-	1	2	-	1	-	1	-
7	Chukchi Sea	3	1	1	1	-	-	1	-	1	-	1	-
8	Chukchi Sea	2	1	1	1	-	-	1	-	-	-	1	-
9	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
10	Chukchi Sea	1	-	1	1	-	-	-	-	-	-	-	-
11	Chukchi Sea	2	-	1	1	-	-	-	-	-	-	1	-
12	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
13	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
14	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
15	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
16	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
17	Chukchi Sea	2	-	1	2	-	1	-	-	-	-	1	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
18	Chukchi Sea	2	-	1	3	-	1	1	-	1	-	2	2
19	Chukchi Sea	2	-	1	2	-	1	1	-	1	-	2	1
20	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	1
21	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-

Table A.2-23. 180 Days-(Annual BS

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Bering Strait	-	-	-	-	1	-	-	1	-	-	-	-
2	Bering Strait	-	-	-	-	1	-	-	1	-	1	-	-
3	Chukchi Sea	1	1	1	1	-	1	1	-	1	-	1	-
4	Chukchi Sea	2	1	1	2	1	1	1	1	1	-	2	1
5	Chukchi Sea	4	2	2	2	1	1	2	1	1	1	2	1
6	Chukchi Sea	5	3	3	3	1	2	3	1	2	1	3	2
7	Chukchi Sea	5	3	3	4	1	2	3	1	3	1	4	2
8	Chukchi Sea	3	1	2	2	1	1	2	1	1	1	2	1
9	Chukchi Sea	2	1	1	1	1	1	1	-	1	-	1	-
10	Chukchi Sea	2	1	1	2	1	1	1	1	1	-	1	1
11	Chukchi Sea	3	1	2	2	1	1	1	1	1	1	2	1
12	Chukchi Sea	2	1	1	2	1	1	1	-	1	1	1	1
13	Chukchi Sea	2	1	1	1	1	1	1	-	1	1	1	1
14	Chukchi Sea	2	1	1	2	1	1	1	1	1	-	1	1
15	Chukchi Sea	1	1	1	2	1	1	1	1	1	1	1	1
16	Chukchi Sea	1	1	1	2	1	1	1	1	1	1	1	1
17	Chukchi Sea	2	1	2	3	1	2	1	1	2	1	3	2
18	Chukchi Sea	3	2	3	4	3	3	2	2	3	2	4	4
19	Chukchi Sea	3	2	2	4	2	2	2	1	2	2	3	3
20	Chukchi Sea	1	1	1	2	1	1	1	1	1	1	1	1
21	Chukchi Sea	1	-	1	1	-	1	1	-	1	-	1	1
22	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
23	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	-	1
24	Beaufort Sea	-	-	1	1	-	-	-	-	-	-	1	1
25	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	1	-
26	Beaufort Sea	-	-	-	-	-	-	-	-	-	-	1	-
38	Beaufort Sea	-	-	1	-	-	-	-	-	1	-	-	-

Table A.2-24. 360 Days-(Annual BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Bering Strait	-	-	-	-	1	-	-	1	-	-	-	-
2	Bering Strait	-	-	-	-	1	-	-	1	-	1	-	-
3	Chukchi Sea	1	1	1	1	-	1	1	-	1	-	1	1
4	Chukchi Sea	2	1	1	2	1	1	1	1	1	-	2	1
5	Chukchi Sea	4	2	2	2	1	1	2	1	1	1	2	1
6	Chukchi Sea	5	3	3	4	1	2	3	1	2	1	3	2
7	Chukchi Sea	5	3	3	4	1	2	3	1	3	1	4	2
8	Chukchi Sea	3	1	2	2	1	1	2	1	1	1	2	1
9	Chukchi Sea	2	1	1	2	1	1	1	-	1	-	1	-
10	Chukchi Sea	2	1	1	2	1	1	1	1	1	-	1	1
11	Chukchi Sea	3	1	2	2	1	1	1	1	1	1	2	1
12	Chukchi Sea	2	1	1	2	1	1	1	-	1	1	1	1
13	Chukchi Sea	2	1	1	1	1	1	1	-	1	1	1	1
14	Chukchi Sea	2	1	1	2	1	1	1	1	1	-	1	1
15	Chukchi Sea	2	1	1	2	1	1	1	1	1	1	2	1
16	Chukchi Sea	1	1	1	2	1	1	1	1	1	1	1	1
17	Chukchi Sea	3	1	2	3	1	2	2	1	2	1	3	2
18	Chukchi Sea	3	2	3	4	3	3	2	2	3	2	4	4
19	Chukchi Sea	3	2	2	4	2	3	2	1	2	2	3	3
20	Chukchi Sea	1	1	1	2	1	1	1	1	1	1	1	1
21	Chukchi Sea	1	-	1	1	-	1	1	-	1	-	1	1
22	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
23	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	1	1
24	Beaufort Sea	-	-	1	1	-	-	-	-	-	-	1	1
25	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	1	-
26	Beaufort Sea	-	-	-	-	-	-	-	-	-	-	1	-
38	Beaufort Sea	-	-	1	-	-	-	-	-	1	-	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

Tables A.2-25 through A.2-30 represent summer conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain environmental resource area within:

Table A.2-25. 3 Days-(Summer ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	-	-	-	-	1	2	-	2	-	11	-	12
1	Kasegaluk Lagoon Area	-	-	-	-	1	1	-	-	-	11	-	-
6	Hanna Shoal	-	-	-	12	-	2	-	-	-	-	24	-
7	Krill Trap	-	-	-	-	-	-	-	-	-	-	-	2
10	Ledyard Bay SPEI Critical Habitat Area	-	-	-	-	16	8	-	19	-	54	-	1
15	Cape Lisburne Seabird Colony Area	-	-	-	-	5	-	-	16	-	2	-	-
16	Barrow Canyon	-	-	-	-	-	1	-	-	-	-	1	11
18	Murre Rearing and Molting Area	-	1	-	-	1	-	-	1	-	-	-	-
19	Chukchi Spring Lead System	-	-	-	-	3	4	-	3	-	12	-	9
23	Polar Bear Offshore	-	-	-	-	11	4	-	11	-	11	-	-
38	SUA: Pt. Hope - Cape Lisburne	-	-	-	-	-	-	-	3	-	-	-	-
39	SUA: Pt. Lay - Kasegaluk	-	-	-	-	2	1	-	1	-	25	-	-
40	SUA: Icy Cape - Wainwright	-	-	1	-	2	14	-	-	3	19	1	56
42	SUA: Barrow - East Arch	-	-	-	-	-	-	-	-	-	-	-	2
43	SUA: Nuiqsut - Cross Island	-	-	-	-	-	-	-	-	-	-	-	1
47	Hanna Shoal Walrus Use Area	1	-	4	62	1	27	-	-	5	1	**	37
49	Chukchi Spring Lead 1	-	-	-	-	1	-	-	1	-	-	-	-
50	Pt Lay Walrus Offshore	-	-	-	-	25	12	-	22	1	50	-	3
51	Pt Lay Walrus Nearshore	-	-	-	-	3	1	-	2	-	35	-	-
53	Chukchi Spring Lead 2	-	-	-	-	9	5	-	9	-	16	-	-
54	Chukchi Spring Lead 3	-	-	-	-	-	4	-	-	-	3	-	15
56	Hanna Shoal Area	-	-	1	21	-	6	-	-	-	-	44	13
57	Skull Cliffs	-	-	-	-	-	1	-	-	-	-	-	10
61	Pt Lay-Barrow BH GW SFF	-	-	2	4	4	31	-	-	7	35	16	81
64	Peard Bay Area	-	-	-	-	-	2	-	-	-	-	1	18
70	North Central Chukchi	2	-	-	-	-	-	-	-	-	-	-	-
102	Opilio Crab EFH	-	-	-	-	-	-	-	1	-	-	-	-
103	Saffron Cod EFH	-	-	-	-	5	13	-	13	2	34	3	49
107	Pt Hope Offshore	-	-	-	-	-	-	-	1	-	-	-	-
108	Barrow Feeding Aggregation	-	-	-	-	-	-	-	-	-	-	1	3
119	AK BFT Outer Shelf&Slope 10	-	-	-	-	-	-	-	-	-	-	1	3
121	Cape Lisburne - Pt Hope	-	-	-	-	1	-	-	10	-	-	-	-
123	AK Chukchi Offshore	2	3	5	1	-	-	1	-	3	-	-	-
124	Central Chukchi Offshore	-	2	-	-	-	-	2	-	-	-	-	-

Table A.2-26. 10 Days-(Summer ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	2	5	5	2	14	15	5	15	8	30	5	23
1	Kasegaluk Lagoon Area	-	1	1	-	6	3	1	5	1	16	-	1
3	SUA: Uelen/Russia	-	-	-	-	1	-	-	1	-	-	-	-
6	Hanna Shoal	2	1	4	19	1	6	1	-	4	-	31	5
7	Krill Trap	-	-	1	2	1	3	-	-	1	1	3	6
10	Ledyard Bay SPEI Critical Habitat Area	-	3	2	-	24	11	2	28	2	57	1	3
11	Wrangel Island 12 nm & Offshore	2	1	1	-	-	-	1	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	1	-	-	1	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	1	-	-	10	2	-	21	1	8	-	1
16	Barrow Canyon	1	1	4	3	3	11	1	1	6	7	8	24
18	Murre Rearing and Molting Area	1	7	3	-	9	3	5	13	3	5	-	1
19	Chukchi Spring Lead System	-	-	1	-	6	6	-	6	2	14	1	11
20	East Chukchi Offshore	-	-	-	-	-	-	-	-	-	-	1	1
23	Polar Bear Offshore	-	1	-	-	13	5	1	14	1	14	-	1
29	AK BFT Bowhead FM 8	-	-	-	-	-	-	-	-	-	-	-	1
30	Beaufort Spring Lead 1	-	-	-	-	-	1	-	-	-	-	-	2
31	Beaufort Spring Lead 2	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	-	-	-	2	-	-	4	-	2	-	-
39	SUA: Pt. Lay - Kasegaluk	-	2	1	-	7	3	1	7	1	29	-	1
40	SUA: Icy Cape - Wainwright	2	6	8	2	17	27	6	11	13	38	4	60
42	SUA: Barrow - East Arch	1	-	1	3	1	4	-	-	2	2	5	7
43	SUA: Nuiqsut - Cross Island	-	-	-	1	-	1	-	-	1	-	1	2
47	Hanna Shoal Walrus Use Area	12	6	20	71	6	37	7	2	22	7	**	48
49	Chukchi Spring Lead 1	-	-	-	-	1	-	-	2	-	-	-	-
50	Pt Lay Walrus Offshore	1	5	4	1	35	18	5	34	5	57	1	7
51	Pt Lay Walrus Nearshore	-	1	1	-	8	3	1	9	1	37	-	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
52	Russian Coast Walrus Offshore	1	5	2	-	8	2	4	11	2	4	-	-
53	Chukchi Spring Lead 2	-	-	-	-	10	5	-	11	1	16	-	1
54	Chukchi Spring Lead 3	-	1	1	1	3	7	1	1	2	7	2	16
56	Hanna Shoal Area	5	2	7	28	2	13	2	1	7	3	48	20
57	Skull Cliffs	-	1	2	1	3	6	1	1	3	6	2	13
58	Russian Coast Walrus Nearshore	-	1	-	-	2	-	1	3	-	1	-	-
61	Pt Lay-Barrow BH GW SFF	5	9	15	13	22	44	10	14	23	49	27	83
63	North Chukchi	1	-	-	-	-	-	-	-	-	-	-	-
64	Peard Bay Area	1	2	4	4	4	13	2	2	7	9	8	28
66	Herald Island	1	-	-	-	-	-	1	-	-	-	-	-
70	North Central Chukchi	3	-	1	1	-	-	-	-	-	-	-	-
74	Offshore Herald Island	1	1	1	1	-	-	1	-	1	-	-	-
80	Beaufort Outer Shelf 1	-	-	-	-	-	-	-	-	-	-	1	1
82	N Chukotka Nrshr 2	-	1	-	-	1	-	1	1	-	-	-	-
83	N Chukotka Nrshr 3	-	2	-	-	2	-	1	3	-	1	-	-
91	Hope Sea Valley	1	1	1	-	1	-	1	1	-	-	-	-
102	Opilio Crab EFH	-	-	-	-	3	1	-	5	-	1	-	-
103	Saffron Cod EFH	2	8	10	6	28	33	7	31	16	54	14	59
107	Pt Hope Offshore	-	-	-	-	2	-	-	4	-	1	-	-
108	Barrow Feeding Aggregation	1	-	1	2	1	3	-	-	2	1	5	7
115	AK BFT Outer Shelf&Slope 6	-	-	-	-	-	-	-	-	-	-	1	1
116	AK BFT Outer Shelf&Slope 7	-	-	-	1	-	1	-	-	-	-	1	2
117	AK BFT Outer Shelf&Slope 8	-	-	-	1	-	1	-	-	-	-	2	3
118	AK BFT Outer Shelf&Slope 9	-	-	-	1	-	1	-	-	1	-	2	4
119	AK BFT Outer Shelf&Slope 10	1	-	2	5	1	6	-	-	3	3	9	13
120	Russia CH GW Fall 1&2	-	2	-	-	3	1	1	5	-	1	-	-
121	Cape Lisburne - Pt Hope	-	-	-	-	5	1	-	14	-	4	-	-
123	AK Chukchi Offshore	3	4	7	5	1	2	3	1	6	1	3	1
124	Central Chukchi Offshore	2	5	3	1	1	1	5	1	2	1	1	-

Table A.2-27. 30 Days-(Summer ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	17	32	26	16	44	37	30	46	30	54	20	39
1	Kasegaluk Lagoon Area	1	3	2	1	9	4	3	9	2	19	1	1
2	Point Barrow, Plover Islands	-	-	1	1	-	1	-	-	1	1	2	2
3	SUA: Uelen/Russia	1	3	2	1	4	1	3	5	2	2	1	1
4	SUA:Naukan/Russia	-	-	-	-	1	-	-	1	-	-	-	-
6	Hanna Shoal	7	6	10	23	4	11	6	2	10	3	36	12
7	Krill Trap	2	2	3	4	3	6	2	2	4	4	6	10
10	Ledyard Bay SPEI Critical Habitat Area	1	7	5	2	29	13	6	33	6	59	2	5
11	Wrangel Island 12 nm & Offshore	8	8	7	6	3	3	8	3	6	2	4	2
14	Cape Thompson Seabird Colony Area	-	-	-	-	2	-	-	2	-	1	-	-
15	Cape Lisburne Seabird Colony Area	1	3	2	-	13	4	3	24	2	10	1	2
16	Barrow Canyon	4	7	10	7	11	18	8	8	13	14	12	30
18	Murre Rearing and Molting Area	4	13	8	4	19	9	10	24	9	11	4	5
19	Chukchi Spring Lead System	-	1	2	1	8	8	1	8	3	15	2	12
20	East Chukchi Offshore	-	-	-	1	-	1	-	-	-	-	2	2
23	Polar Bear Offshore	-	1	1	1	14	7	1	14	2	16	1	4
27	AK BFT Bowhead FM 6	-	-	-	-	-	-	-	-	-	-	1	-
28	AK BFT Bowhead FM 7	-	-	-	-	-	-	-	-	-	-	1	-
29	AK BFT Bowhead FM 8	-	-	1	1	-	1	-	-	-	-	1	1
30	Beaufort Spring Lead 1	-	-	-	-	1	2	-	-	1	1	1	4
31	Beaufort Spring Lead 2	-	-	-	-	-	1	-	-	-	1	-	2
38	SUA: Pt. Hope - Cape Lisburne	-	1	-	-	4	1	1	7	1	3	-	1
39	SUA: Pt. Lay - Kasegaluk	1	4	3	1	11	5	3	11	3	31	1	2
40	SUA: Icy Cape - Wainwright	6	14	14	7	29	34	14	23	20	46	9	62
42	SUA: Barrow - East Arch	3	3	5	7	3	7	3	3	5	4	10	10
43	SUA: Nuiqsut - Cross Island	1	1	2	2	1	3	1	1	2	1	4	4
44	SUA: Kaktovik	-	-	-	-	-	-	-	-	-	-	-	1
47	Hanna Shoal Walrus Use Area	24	20	32	75	17	46	20	12	34	17	**	55
49	Chukchi Spring Lead 1	-	-	-	-	1	-	-	3	-	1	-	-
50	Pt Lay Walrus Offshore	3	11	8	3	40	21	10	39	10	60	3	9
51	Pt Lay Walrus Nearshore	1	3	2	1	11	5	3	12	2	38	1	2
52	Russian Coast Walrus Offshore	5	14	10	5	20	10	12	24	10	13	5	6
53	Chukchi Spring Lead 2	-	1	1	-	11	5	1	12	1	17	-	1
54	Chukchi Spring Lead 3	-	2	2	1	6	9	2	4	4	10	3	16
55	Point Barrow, Plover Islands	-	-	1	1	-	1	-	-	1	1	2	2
56	Hanna Shoal Area	12	8	13	32	6	17	8	5	12	7	51	24

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
57	Skull Cliffs	2	4	4	2	6	10	3	5	6	9	4	16
58	Russian Coast Walrus Nearshore	1	4	3	1	8	3	4	11	3	5	1	2
59	Ostrov Kolyuchin	1	2	1	-	2	1	2	2	1	1	-	1
61	Pt Lay-Barrow BH GW SFF	14	23	27	22	37	53	23	30	34	58	36	86
63	North Chukchi	4	1	2	2	-	-	1	-	1	-	1	-
64	Peard Bay Area	5	8	10	8	12	21	9	9	14	16	13	34
66	Herald Island	3	3	3	3	1	1	3	1	2	1	2	1
70	North Central Chukchi	4	1	2	4	1	1	1	1	2	1	3	1
74	Offshore Herald Island	4	3	4	4	2	2	3	1	4	1	4	1
80	Beaufort Outer Shelf 1	1	1	1	1	-	1	1	-	1	1	2	3
82	N Chukotka Nrshr 2	4	9	5	2	6	4	8	8	5	4	2	2
83	N Chukotka Nrshr 3	3	8	5	2	10	4	7	13	5	6	2	2
91	Hope Sea Valley	3	5	4	3	4	3	5	4	5	3	3	2
101	Beaufort Outer Shelf 2	-	-	1	1	-	1	-	-	1	1	2	1
102	Opilio Crab EFH	-	2	1	1	6	3	1	8	2	4	1	1
103	Saffron Cod EFH	10	22	23	15	47	47	22	49	30	67	24	66
107	Pt Hope Offshore	-	1	1	-	4	2	1	6	1	3	-	1
108	Barrow Feeding Aggregation	3	2	4	6	1	5	2	1	3	2	8	9
111	AK BFT Outer Shelf&Slope 2	-	-	-	1	-	-	-	-	-	-	1	1
112	AK BFT Outer Shelf&Slope 3	-	-	-	1	-	1	-	-	1	-	1	1
113	AK BFT Outer Shelf&Slope 4	1	-	1	1	-	1	-	-	1	1	2	1
114	AK BFT Outer Shelf&Slope 5	1	-	1	1	-	1	1	-	1	-	2	1
115	AK BFT Outer Shelf&Slope 6	1	1	1	2	1	2	1	-	2	1	3	3
116	AK BFT Outer Shelf&Slope 7	2	1	2	3	1	3	1	-	2	1	4	4
117	AK BFT Outer Shelf&Slope 8	3	1	3	4	1	4	2	1	3	2	6	6
118	AK BFT Outer Shelf&Slope 9	3	2	3	5	2	5	2	2	3	3	6	8
119	AK BFT Outer Shelf&Slope 10	5	5	8	10	8	14	5	6	9	9	16	21
120	Russia CH GW Fall 1&2	2	6	4	2	9	4	5	12	5	6	2	2
121	Cape Lisburne - Pt Hope	-	2	1	-	8	2	1	17	1	5	1	1
122	North Chukotka Offshore	2	3	2	1	1	1	3	1	2	1	1	1
123	AK Chukchi Offshore	4	6	9	7	3	4	4	2	7	2	7	4
124	Central Chukchi Offshore	4	7	5	4	4	5	7	4	6	4	4	3

Table A.2-28. 60 Days-(Summer ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	22	36	31	22	47	40	34	49	35	56	24	43
1	Kasegaluk Lagoon Area	1	3	2	1	9	4	3	9	3	19	1	1
2	Point Barrow, Plover Islands	-	-	1	1	1	1	-	-	1	1	2	2
3	SUA: Uelen/Russia	1	4	2	1	4	2	3	5	2	2	1	1
4	SUA:Naukan/Russia	-	-	-	-	1	-	-	1	-	1	-	-
6	Hanna Shoal	9	8	11	24	5	12	8	3	11	4	37	12
7	Krill Trap	2	3	4	4	4	7	3	3	4	5	6	10
10	Ledyard Bay SPEI Critical Habitat Area	2	8	5	2	29	14	7	33	6	59	2	5
11	Wrangel Island 12 nm & Offshore	11	10	9	8	5	5	10	5	7	3	6	3
14	Cape Thompson Seabird Colony Area	-	-	-	-	2	-	-	2	-	1	-	-
15	Cape Lisburne Seabird Colony Area	1	3	2	1	13	4	3	24	2	10	1	2
16	Barrow Canyon	5	8	10	8	12	19	9	9	13	15	13	31
18	Murre Rearing and Molting Area	4	14	9	5	19	9	11	24	9	11	5	5
19	Chukchi Spring Lead System	-	1	2	1	8	8	1	8	3	15	2	12
20	East Chukchi Offshore	1	-	1	2	-	1	-	-	1	-	3	2
23	Polar Bear Offshore	-	1	1	1	14	7	1	14	2	16	1	4
27	AK BFT Bowhead FM 6	-	-	-	1	-	-	-	-	-	-	1	1
28	AK BFT Bowhead FM 7	-	-	-	1	-	-	-	-	-	-	1	1
29	AK BFT Bowhead FM 8	-	-	1	1	-	1	-	-	-	-	1	1
30	Beaufort Spring Lead 1	-	-	-	-	1	2	-	-	1	1	1	4
31	Beaufort Spring Lead 2	-	-	-	-	-	1	-	-	-	1	-	2
38	SUA: Pt. Hope - Cape Lisburne	-	1	-	-	4	1	1	7	1	3	-	1
39	SUA: Pt. Lay - Kasegaluk	1	4	3	1	11	5	3	12	3	31	1	2
40	SUA: Icy Cape - Wainwright	7	15	15	7	30	34	15	25	21	47	9	62
42	SUA: Barrow - East Arch	4	4	6	8	4	8	4	3	6	5	11	10
43	SUA: Nuiqsut - Cross Island	1	1	2	3	1	3	1	1	2	1	4	4
44	SUA: Kaktovik	-	-	-	-	-	-	-	-	-	-	1	1
46	Wrangel Island 12 nmi Buffer 2	1	-	1	1	-	1	-	-	1	-	1	1
47	Hanna Shoal Walrus Use Area	26	23	34	76	19	47	23	14	36	19	**	56
48	Chukchi Lead System 4	-	-	-	-	-	-	-	-	-	1	-	1
49	Chukchi Spring Lead 1	-	-	-	-	1	-	-	3	-	1	-	-
50	Pt Lay Walrus Offshore	3	12	9	3	41	21	11	39	11	60	3	9
51	Pt Lay Walrus Nearshore	1	4	2	1	12	5	3	12	3	38	1	2

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
52	Russian Coast Walrus Offshore	5	15	10	6	20	10	13	24	10	13	5	6
53	Chukchi Spring Lead 2	-	1	1	-	11	5	1	12	1	17	-	1
54	Chukchi Spring Lead 3	-	2	2	1	6	9	2	4	4	10	3	16
55	Point Barrow, Plover Islands	-	-	1	1	1	1	-	-	1	1	2	2
56	Hanna Shoal Area	13	10	14	33	8	19	11	6	14	8	52	25
57	Skull Cliffs	3	4	4	3	7	10	4	5	6	9	4	16
58	Russian Coast Walrus Nearshore	1	5	3	2	8	3	4	11	3	5	2	2
59	Ostrov Kolyuchin	1	2	1	1	2	1	2	3	1	1	1	1
61	Pt Lay-Barrow BH GW SFF	16	25	29	23	38	54	25	31	36	60	36	86
63	North Chukchi	5	1	2	2	-	1	1	-	2	1	2	1
64	Peard Bay Area	6	9	11	8	13	21	10	10	14	17	14	35
65	Smith Bay	-	-	-	-	-	-	-	-	-	-	1	1
66	Herald Island	4	3	3	3	2	2	3	2	3	1	3	1
70	North Central Chukchi	5	1	2	4	1	1	1	1	2	1	3	1
74	Offshore Herald Island	5	3	4	4	2	2	3	1	4	1	4	2
80	Beaufort Outer Shelf 1	1	1	1	2	1	2	1	-	2	1	3	3
82	N Chukotka Nrshr 2	4	9	5	2	7	4	8	8	5	4	2	2
83	N Chukotka Nrshr 3	3	9	6	3	10	5	8	13	5	6	2	2
91	Hope Sea Valley	3	5	4	3	4	4	5	4	5	3	3	3
101	Beaufort Outer Shelf 2	1	1	1	1	-	1	1	-	1	1	2	2
102	Opilio Crab EFH	-	2	1	1	6	3	1	8	2	4	1	1
103	Saffron Cod EFH	12	25	25	16	49	48	24	51	32	68	25	67
107	Pt Hope Offshore	-	1	1	1	4	2	1	7	1	3	1	1
108	Barrow Feeding Aggregation	4	2	4	6	1	5	3	1	4	2	8	10
109	AK BFT Shelf Edge	-	-	-	1	-	-	-	-	-	-	1	-
110	AK BFT Outer Shelf&Slope 1	1	-	1	1	-	-	-	-	-	-	1	1
111	AK BFT Outer Shelf&Slope 2	1	-	1	1	-	1	-	-	1	-	2	1
112	AK BFT Outer Shelf&Slope 3	1	-	1	1	-	1	1	-	1	1	2	1
113	AK BFT Outer Shelf&Slope 4	1	1	1	2	1	2	1	-	1	1	2	2
114	AK BFT Outer Shelf&Slope 5	1	1	2	2	1	2	1	-	2	1	3	2
115	AK BFT Outer Shelf&Slope 6	2	1	2	3	1	3	2	1	2	1	4	4
116	AK BFT Outer Shelf&Slope 7	3	2	3	4	1	4	2	1	3	2	5	6
117	AK BFT Outer Shelf&Slope 8	4	2	4	5	2	5	3	2	4	3	8	8
118	AK BFT Outer Shelf&Slope 9	4	3	5	6	4	7	3	3	5	4	8	10
119	AK BFT Outer Shelf&Slope 10	7	7	10	12	10	15	8	8	11	11	17	22
120	Russia CH GW Fall 1&2	2	7	5	2	9	4	6	12	5	6	2	2
121	Cape Lisburne - Pt Hope	-	2	1	1	8	2	2	17	1	5	1	1
122	North Chukotka Offshore	2	3	2	2	1	1	3	1	2	1	2	1
123	AK Chukchi Offshore	5	6	9	8	3	5	4	3	8	3	8	4
124	Central Chukchi Offshore	4	7	5	4	4	5	7	4	6	4	5	3

Table A.2-29. 180 Days-(Summer ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	25	39	35	26	49	43	38	50	38	58	28	45
1	Kasegaluk Lagoon Area	1	3	3	1	9	4	3	9	3	19	1	1
2	Point Barrow, Plover Islands	1	-	1	1	1	1	-	-	1	1	2	2
3	SUA: Uelen/Russia	2	4	3	2	4	2	4	5	3	2	1	1
4	SUA:Naukan/Russia	-	-	-	-	1	-	-	1	-	1	-	-
6	Hanna Shoal	10	9	12	25	5	13	9	4	12	5	38	13
7	Krill Trap	3	3	4	4	4	7	3	3	5	5	6	10
10	Ledyard Bay SPEI Critical Habitat Area	2	8	6	2	29	14	7	33	6	59	2	5
11	Wrangel Island 12 nm & Offshore	12	11	10	9	5	6	12	5	8	4	7	5
14	Cape Thompson Seabird Colony Area	-	-	-	-	2	-	-	2	-	1	-	-
15	Cape Lisburne Seabird Colony Area	1	3	2	1	13	4	3	24	2	10	1	2
16	Barrow Canyon	5	9	11	8	12	19	9	9	14	15	13	31
18	Murre Rearing and Molting Area	5	14	10	6	20	10	11	25	10	12	5	5
19	Chukchi Spring Lead System	-	1	2	1	8	8	1	8	3	15	2	12
20	East Chukchi Offshore	1	1	1	2	1	2	1	1	1	1	3	4
23	Polar Bear Offshore	-	1	1	1	14	7	1	14	2	16	2	4
26	AK BFT Bowhead FM 5	-	-	-	-	-	-	-	-	-	-	1	1
27	AK BFT Bowhead FM 6	-	-	-	1	-	-	-	-	-	-	1	1
28	AK BFT Bowhead FM 7	-	-	-	1	-	-	-	-	-	-	1	1
29	AK BFT Bowhead FM 8	-	-	1	1	-	1	-	-	-	-	1	1
30	Beaufort Spring Lead 1	-	-	-	-	1	2	-	-	1	1	1	4
31	Beaufort Spring Lead 2	-	-	-	-	-	1	-	-	-	1	-	2
32	Beaufort Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	1	-	-	4	1	1	7	1	3	-	1
39	SUA: Pt. Lay - Kasegaluk	1	4	3	1	11	5	3	12	3	31	1	2

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
40	SUA: Icy Cape - Wainwright	7	16	16	8	30	35	16	25	21	47	10	62
42	SUA: Barrow - East Arch	5	5	6	8	5	8	5	4	6	5	11	11
43	SUA: Nuiqsut - Cross Island	2	2	3	3	2	3	2	1	3	2	5	4
44	SUA: Kaktovik	1	-	1	1	-	1	-	-	1	-	1	1
46	Wrangel Island 12 nmi Buffer 2	1	1	2	2	1	1	1	-	2	1	2	1
47	Hanna Shoal Walrus Use Area	27	23	35	76	20	48	24	14	36	20	**	57
48	Chukchi Lead System 4	-	-	-	-	-	1	-	-	-	1	1	1
49	Chukchi Spring Lead 1	-	-	-	-	1	-	-	3	-	1	-	-
50	Pt Lay Walrus Offshore	4	12	9	3	41	21	11	39	11	60	3	9
51	Pt Lay Walrus Nearshore	1	4	2	1	12	5	3	12	3	38	1	2
52	Russian Coast Walrus Offshore	6	16	11	6	20	11	14	25	12	13	6	6
53	Chukchi Spring Lead 2	-	1	1	-	11	5	1	12	1	17	-	1
54	Chukchi Spring Lead 3	-	2	2	1	6	9	2	4	4	10	3	16
55	Point Barrow, Plover Islands	1	-	1	1	1	1	-	-	1	1	2	2
56	Hanna Shoal Area	15	12	16	35	9	20	13	6	16	9	54	26
57	Skull Cliffs	3	4	5	3	7	10	4	6	7	10	4	16
58	Russian Coast Walrus Nearshore	2	5	4	2	8	4	4	11	4	5	2	2
59	Ostrov Kolyuchin	1	2	1	1	2	1	2	3	1	1	1	1
61	Pt Lay-Barrow BH GW SFF	17	26	29	24	38	55	26	32	36	60	37	86
63	North Chukchi	5	1	3	3	1	1	2	-	2	1	2	1
64	Peard Bay Area	6	9	11	8	13	21	10	10	15	17	14	35
65	Smith Bay	-	-	-	-	-	-	-	-	-	-	1	1
66	Herald Island	4	3	3	3	2	2	3	2	3	1	3	2
70	North Central Chukchi	5	1	3	5	1	2	1	1	3	1	4	2
74	Offshore Herald Island	5	3	4	5	2	3	4	2	4	1	5	2
80	Beaufort Outer Shelf 1	1	1	2	2	1	2	1	-	2	1	3	3
82	N Chukotka Nrshr 2	4	9	5	2	7	4	8	8	5	4	2	2
83	N Chukotka Nrshr 3	4	9	7	4	10	5	8	13	6	6	3	3
91	Hope Sea Valley	4	6	4	3	4	4	5	4	5	3	3	3
101	Beaufort Outer Shelf 2	1	1	1	2	1	2	1	-	1	1	2	2
102	Opilio Crab EFH	-	2	1	1	6	3	1	8	2	4	1	1
103	Saffron Cod EFH	13	25	25	17	49	49	25	51	32	68	26	67
107	Pt Hope Offshore	-	1	1	1	4	2	1	7	1	3	1	1
108	Barrow Feeding Aggregation	4	3	4	6	2	6	3	1	4	3	9	10
109	AK BFT Shelf Edge	1	1	1	1	-	1	1	-	1	-	1	1
110	AK BFT Outer Shelf&Slope 1	1	1	1	1	-	1	1	-	1	-	1	1
111	AK BFT Outer Shelf&Slope 2	1	1	1	1	1	1	1	-	1	1	2	2
112	AK BFT Outer Shelf&Slope 3	1	1	1	1	1	2	1	-	2	1	2	2
113	AK BFT Outer Shelf&Slope 4	1	2	2	2	1	2	2	1	2	1	3	3
114	AK BFT Outer Shelf&Slope 5	2	2	2	2	1	2	2	1	2	1	3	3
115	AK BFT Outer Shelf&Slope 6	2	2	3	3	1	3	2	1	3	1	4	4
116	AK BFT Outer Shelf&Slope 7	3	3	3	4	2	5	3	1	4	2	6	6
117	AK BFT Outer Shelf&Slope 8	4	3	5	6	3	6	4	2	5	3	8	8
118	AK BFT Outer Shelf&Slope 9	4	4	5	6	4	8	4	4	6	5	9	11
119	AK BFT Outer Shelf&Slope 10	7	8	10	12	10	16	8	8	11	11	18	23
120	Russia CH GW Fall 1&2	3	7	5	3	10	5	6	12	6	6	3	2
121	Cape Lisburne - Pt Hope	-	2	1	1	8	2	2	17	1	5	1	1
122	North Chukotka Offshore	2	3	3	2	1	2	3	1	3	1	2	1
123	AK Chukchi Offshore	5	6	9	8	4	5	4	3	8	3	8	5
124	Central Chukchi Offshore	4	7	6	4	4	5	7	4	6	4	5	3

Table A.2-30. 360 Days-(Summer ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	25	40	35	26	49	43	38	50	38	58	28	45
1	Kasegaluk Lagoon Area	1	3	3	1	9	4	3	9	3	19	1	1
2	Point Barrow, Plover Islands	1	-	1	1	1	1	-	-	1	1	2	2
3	SUA: Uelen/Russia	2	4	3	2	4	2	4	5	3	2	1	1
4	SUA:Naukan/Russia	-	-	-	-	1	-	-	1	-	1	-	-
6	Hanna Shoal	10	9	12	25	5	13	9	4	12	5	38	14
7	Krill Trap	3	3	4	4	4	7	3	3	5	5	6	10
10	Ledyard Bay SPEI Critical Habitat Area	2	8	6	2	29	14	7	33	6	59	2	5
11	Wrangel Island 12 nm & Offshore	12	11	10	9	5	6	12	5	8	4	7	5
14	Cape Thompson Seabird Colony Area	-	-	-	-	2	-	-	2	-	1	-	-
15	Cape Lisburne Seabird Colony Area	1	3	2	1	13	4	3	24	2	10	1	2
16	Barrow Canyon	5	9	11	8	12	19	9	9	14	15	13	31
18	Murre Rearing and Molting Area	5	14	10	6	20	10	11	25	10	12	5	5
19	Chukchi Spring Lead System	-	1	2	1	8	8	1	8	3	15	2	12
20	East Chukchi Offshore	1	1	1	2	1	2	1	1	1	1	3	4

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
23	Polar Bear Offshore	-	1	1	1	14	7	1	14	2	16	2	4
26	AK BFT Bowhead FM 5	-	-	-	-	-	-	-	-	-	-	1	1
27	AK BFT Bowhead FM 6	-	-	-	1	-	-	-	-	-	-	1	1
28	AK BFT Bowhead FM 7	-	-	-	1	-	-	-	-	-	-	1	1
29	AK BFT Bowhead FM 8	-	-	1	1	-	1	-	-	-	-	1	1
30	Beaufort Spring Lead 1	-	-	-	-	1	2	-	-	1	1	1	4
31	Beaufort Spring Lead 2	-	-	-	-	-	1	-	-	-	1	-	2
32	Beaufort Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	1	-	-	4	1	1	7	1	3	-	1
39	SUA: Pt. Lay - Kasegaluk	1	4	3	1	11	5	3	12	3	31	1	2
40	SUA: Icy Cape - Wainwright	7	16	16	8	30	35	16	25	21	47	10	62
42	SUA: Barrow - East Arch	5	5	6	8	5	8	5	4	6	5	11	11
43	SUA: Nuiqsut - Cross Island	2	2	3	3	2	3	2	1	3	2	5	4
44	SUA: Kaktovik	1	-	1	1	-	1	-	-	1	-	1	1
46	Wrangel Island 12 nmi Buffer 2	1	1	2	2	1	2	1	-	2	1	2	1
47	Hanna Shoal Walrus Use Area	27	23	35	76	20	48	24	14	36	20	**	57
48	Chukchi Lead System 4	-	-	-	-	-	1	-	-	-	1	1	1
49	Chukchi Spring Lead 1	-	-	-	-	1	-	-	3	-	1	-	-
50	Pt Lay Walrus Offshore	4	12	9	3	41	21	11	39	11	60	3	9
51	Pt Lay Walrus Nearshore	1	4	2	1	12	5	3	12	3	38	1	2
52	Russian Coast Walrus Offshore	6	16	11	6	20	11	14	25	12	13	6	6
53	Chukchi Spring Lead 2	-	1	1	-	11	5	1	12	1	17	-	1
54	Chukchi Spring Lead 3	-	2	2	1	6	9	2	4	4	10	3	16
55	Point Barrow, Plover Islands	1	-	1	1	1	1	-	-	1	1	2	2
56	Hanna Shoal Area	15	12	16	35	9	20	13	6	16	9	54	26
57	Skull Cliffs	3	4	5	3	7	10	4	6	7	10	4	16
58	Russian Coast Walrus Nearshore	2	5	4	2	8	4	4	11	4	5	2	2
59	Ostrov Kolyuchin	1	2	1	1	2	1	2	3	1	1	1	1
61	Pt Lay-Barrow BH GW SFF	17	26	29	24	38	55	26	32	36	60	37	86
63	North Chukchi	5	1	3	3	1	1	2	-	2	1	2	1
64	Peard Bay Area	6	9	11	8	13	21	10	10	15	17	14	35
65	Smith Bay	-	-	-	-	-	-	-	-	-	-	1	1
66	Herald Island	4	3	3	3	2	2	3	2	3	1	3	2
70	North Central Chukchi	5	1	3	5	1	2	1	1	3	1	4	2
74	Offshore Herald Island	5	3	4	5	2	3	4	2	4	1	5	2
80	Beaufort Outer Shelf 1	1	1	2	2	1	2	1	-	2	1	3	3
82	N Chukotka Nrshr 2	4	9	5	2	7	4	8	8	5	4	2	2
83	N Chukotka Nrshr 3	4	9	7	4	10	5	8	13	6	6	3	3
91	Hope Sea Valley	4	6	4	3	4	4	5	4	5	3	3	3
101	Beaufort Outer Shelf 2	1	1	1	2	1	2	1	-	1	1	2	2
102	Opilio Crab EFH	-	2	1	1	6	3	1	8	2	4	1	1
103	Saffron Cod EFH	13	25	25	17	49	49	25	51	32	68	26	67
107	Pt Hope Offshore	-	1	1	1	4	2	1	7	1	3	1	1
108	Barrow Feeding Aggregation	4	3	4	6	2	6	3	1	4	3	9	10
109	AK BFT Shelf Edge	1	1	1	1	-	1	1	-	1	-	1	1
110	AK BFT Outer Shelf&Slope 1	1	1	1	1	-	1	1	-	1	-	1	1
111	AK BFT Outer Shelf&Slope 2	1	1	1	1	1	1	1	-	1	1	2	2
112	AK BFT Outer Shelf&Slope 3	1	1	1	1	1	2	1	-	2	1	2	2
113	AK BFT Outer Shelf&Slope 4	1	2	2	2	1	2	2	1	2	1	3	3
114	AK BFT Outer Shelf&Slope 5	2	2	2	2	1	2	2	1	2	1	3	3
115	AK BFT Outer Shelf&Slope 6	2	2	3	3	1	3	2	1	3	1	4	4
116	AK BFT Outer Shelf&Slope 7	3	3	3	4	2	5	3	1	4	2	6	6
117	AK BFT Outer Shelf&Slope 8	4	3	5	6	3	6	4	2	5	3	8	8
118	AK BFT Outer Shelf&Slope 9	4	4	5	6	4	8	4	4	6	5	9	11
119	AK BFT Outer Shelf&Slope 10	7	8	10	12	10	16	8	8	11	11	18	23
120	Russia CH GW Fall 1&2	3	7	5	3	10	5	6	12	6	6	3	2
121	Cape Lisburne - Pt Hope	-	2	1	1	8	2	2	17	1	5	1	1
122	North Chukotka Offshore	2	3	3	2	1	2	3	1	3	1	2	1
123	AK Chukchi Offshore	5	6	9	8	4	5	4	3	8	3	8	5
124	Central Chukchi Offshore	4	7	6	4	4	5	7	4	6	4	5	3

Tables A.2-31 through A.2-36 represent summer conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain land segment within:

Table A.2-31. 3 Days-(Summer LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	1	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	3	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	2	-	-
75	Akeonik, Icy Cape	-	-	-	-	-	-	-	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	-	-	-	-	-	1	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	1	-	-	-	1	-	2
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	-	3
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	-	-	-	-	-	2
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	-	-	-	-	-	3

Table A.2-32. 10 Days-(Summer LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	1	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	1	-	-	2	-	1	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	1	-	-	1	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	1	-	-	1	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	-	-	1	-	3	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	-	-	1	-	3	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	1	-	3	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	1	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	1	1	1	1	1	2	-	1
79	Point Belcher, Wainwright	-	1	1	-	2	2	1	1	1	4	-	3
80	Eluksingiak Point, Kugrua Bay	-	-	1	-	1	2	-	-	1	2	-	4
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	1	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	-	1	-	1	2	-	-	1	1	1	4
85	Barrow, Browerville, Elson Lag.	-	-	1	1	1	4	-	-	2	2	2	7

Table A.2-33. 30 Days-(Summer LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
5	Mys Evans	1	-	-	-	-	-	1	-	-	-	-	-
6	Ostrov Mushtakova	1	1	1	1	-	-	1	-	1	-	-	-
7	Kosa Bruch	1	1	1	1	-	-	1	-	1	-	-	-
8	E. Wrangel Island, Skeletov	1	1	1	1	-	-	1	-	1	-	1	-
21	Laguna Pil'khikay, Pil'khikay	-	1	-	-	-	-	-	-	-	-	-	-
22	Rypkarpyy, Mys Shmidta	-	1	-	-	1	-	1	1	1	1	-	-
23	Emuem, Tenkergin	-	1	-	-	1	-	1	1	-	-	-	-
24	LS 24	-	1	-	-	1	-	1	1	-	-	-	-
25	Laguna Amguema, Yulinu	1	1	1	-	1	1	1	1	-	1	-	-
26	Ekugvaam, Kepin, Pil'khin	-	1	1	-	1	1	1	1	-	1	-	-
27	Laguna Nut, Rigol'	-	1	1	-	1	1	1	1	1	1	1	1
28	Vankarem,Vankarem Laguna	-	1	1	-	1	1	1	1	1	1	1	1
29	Mys Onman, Vel'may	-	1	1	-	1	1	1	1	1	1	-	1
30	Nutepynmin, Pyngopil'gyn	-	1	1	-	1	1	1	2	1	1	-	-
31	Alyatki, Zaliv Tasytkhin	-	1	1	-	1	1	1	1	1	1	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	1	1	-	1	-	1	1	1	1	-	-
33	Neskan, Laguna Neskan	-	1	1	-	1	-	1	1	1	1	-	-
34	Tepken, Memino	-	1	-	-	1	-	1	1	1	1	-	-
35	Enurmino, Mys Neten	-	1	-	-	1	-	1	1	-	1	-	-
36	Mys Serdtse-Kamen	-	-	-	-	1	-	-	1	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	1	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	2	1	-	3	-	1	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	1	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	1	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	1	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	1	-	-	2	-	4	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	1	-	1	-	4	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	1	-	-	2	1	1	1	-	3	-	-
75	Akeonik, Icy Cape	-	1	1	-	2	1	1	1	1	3	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	1	1	-	1	-	2	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	1	1	-	1	-	1	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
78	Point Collie, Sigeakruk Point	-	1	1	-	2	2	1	1	1	3	-	1
79	Point Belcher, Wainwright	1	2	2	1	4	3	2	2	2	6	1	4
80	Eluksingiak Point, Kugrua Bay	1	1	1	1	2	3	1	2	2	3	-	4
81	Peard Bay, Point Franklin	-	-	-	-	-	1	-	-	1	1	-	1
82	Skull Cliff	-	-	-	-	-	1	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	1	-	-	1	1	1	1
84	Will Rogers & Wiley Post Mem.	1	1	1	1	2	3	1	1	2	3	2	6
85	Barrow, Browerville, Elson Lag.	1	2	4	3	4	6	2	3	5	4	5	10
88	Cape Simpson, Piasuk River	-	-	-	-	-	-	-	-	-	-	1	-

Table A.2-34. 60 Days-(Summer LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
5	Mys Evans	1	1	1	1	-	-	1	-	-	-	-	-
6	Ostrov Mushtakova	1	1	1	1	-	-	1	-	1	-	-	-
7	Kosa Bruch	1	1	1	1	-	1	1	-	1	-	1	1
8	E. Wrangel Island, Skeletov	1	1	1	1	1	1	1	-	1	-	1	1
21	Laguna Pil'khikay, Pil'khikay	-	1	-	-	-	-	-	-	-	-	-	-
22	Rypkarpyy, Mys Shmidta	-	1	1	-	1	1	1	1	1	1	-	-
23	Emuem, Tenkergin	-	1	-	-	1	1	1	1	-	1	-	-
24	LS 24	1	1	-	-	1	1	1	1	1	1	-	-
25	Laguna Amguema, Yulinu	1	1	1	-	1	1	1	1	1	1	1	1
26	Ekugvaam, Kepin, Pil'khin	1	1	1	-	1	1	1	1	1	1	-	-
27	Laguna Nut, Rigol'	-	1	1	1	1	1	1	1	1	1	1	1
28	Vankarem,Vankarem Laguna	-	1	1	1	1	1	1	1	1	1	1	1
29	Mys Onman, Vel'may	-	1	1	-	1	1	1	1	1	1	-	1
30	Nutepynmin, Pyngopil'gyn	1	1	1	1	1	1	1	2	1	1	1	-
31	Alyatki, Zaliv Tasytkhin	1	1	1	-	1	1	1	2	1	1	1	1
32	Mys Dzhenretlen, Eynenekvyk	1	1	1	-	1	1	1	1	1	1	-	1
33	Neskan, Laguna Neskan	-	1	1	-	1	1	1	1	1	1	-	-
34	Tepken, Memino	-	1	1	-	1	-	1	1	1	1	-	-
35	Enurmino, Mys Neten	-	1	-	-	1	-	1	1	-	1	-	-
36	Mys Serdtse-Kamen	-	-	-	-	1	-	-	1	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	1	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	2	1	-	4	-	1	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	1	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	1	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	1	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	1	-	-	2	-	4	-	-
73	Tungaich Point, Tungak Creek	-	1	-	-	1	1	1	1	-	4	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	1	-	-	2	1	1	1	-	3	-	-
75	Akeonik, Icy Cape	-	1	1	-	2	1	1	1	1	3	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	1	1	-	1	-	2	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	1	1	-	1	-	1	-	-
78	Point Collie, Sigeakruk Point	-	1	1	-	2	2	1	1	1	3	-	1
79	Point Belcher, Wainwright	1	2	2	1	4	4	2	3	3	6	1	4
80	Eluksingiak Point, Kugrua Bay	1	1	1	1	2	3	1	2	2	3	-	4
81	Peard Bay, Point Franklin	-	-	-	-	-	1	-	-	1	1	-	1
82	Skull Cliff	-	-	-	-	-	1	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	1	1	-	-	1	1	1	1
84	Will Rogers & Wiley Post Mem.	1	1	2	1	2	3	1	1	2	3	2	6
85	Barrow, Browerville, Elson Lag.	2	3	4	3	4	6	3	3	5	5	5	10
88	Cape Simpson, Piasuk River	-	-	-	-	-	-	-	-	-	-	1	-

Table A.2-35. 180 Days-(Summer LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
3	Mys Florens, Gusinaya	1	-	-	-	-	-	-	-	-	-	-	-
4	Mys Ushakova, Laguna Drem-Khed	1	-	-	1	-	-	1	-	1	-	-	-
5	Mys Evans	1	1	1	1	-	1	1	-	1	-	1	-
6	Ostrov Mushtakova	2	1	1	1	-	1	1	-	1	-	1	1
7	Kosa Bruch	2	1	1	1	1	1	2	1	1	-	1	1
8	E. Wrangel Island, Skeletov	1	1	1	1	1	1	1	-	1	-	1	1
21	Laguna Pil'khikay, Pil'khikay	-	1	-	-	-	-	1	-	-	-	-	-
22	Rypkarpyy, Mys Shmidta	-	1	1	1	1	1	1	1	1	1	1	-
23	Emuem, Tenkergin	-	1	-	-	1	1	1	1	1	1	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
24	LS 24	1	1	1	-	1	1	1	1	1	1	1	-
25	Laguna Amguema, Yulinu	1	1	1	1	1	1	1	1	1	1	1	1
26	Ekugvaam, Kepin, Pil'khin	1	1	1	1	1	1	1	1	1	1	-	-
27	Laguna Nut, Rigol'	1	1	1	1	1	1	1	1	1	1	1	1
28	Vankarem,Vankarem Laguna	1	1	1	1	1	1	1	1	1	1	1	1
29	Mys Onman, Vel'may	-	1	1	1	1	1	1	1	1	1	-	1
30	Nutepynmin, Pyngopil'gyn	1	1	1	1	1	1	1	2	1	1	1	1
31	Alyatki, Zaliv Tasytkhin	1	1	1	1	1	1	1	2	1	1	1	1
32	Mys Dzhenretlen, Eynenekvyk	1	1	1	1	1	1	1	1	1	1	-	1
33	Neskan, Laguna Neskan	1	1	1	-	1	1	1	1	1	1	-	-
34	Tepken, Memino	-	1	1	-	1	1	1	1	1	1	-	-
35	Enurmino, Mys Neten	-	1	1	-	1	1	1	1	1	1	-	-
36	Mys Serdtse-Kamen	-	-	-	-	1	-	-	1	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	1	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	2	1	-	4	-	1	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	1	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	1	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	1	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	1	-	-	1	-	-	2	-	4	-	-
73	Tungaich Point, Tungak Creek	-	1	-	-	1	1	1	1	-	4	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	1	-	-	2	1	1	1	-	3	-	-
75	Akeonik, Icy Cape	-	1	1	-	2	1	1	1	1	3	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	1	1	-	1	-	2	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	1	1	-	1	-	1	-	-
78	Point Collie, Sigeakruk Point	-	1	1	-	2	2	1	1	1	3	-	1
79	Point Belcher, Wainwright	1	2	2	1	4	4	2	3	3	6	1	4
80	Eluksingiak Point, Kugrua Bay	1	1	1	1	2	3	1	2	2	3	-	4
81	Peard Bay, Point Franklin	-	-	-	-	-	1	-	-	1	1	-	1
82	Skull Cliff	-	-	-	-	-	1	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	1	1	-	-	1	1	1	1
84	Will Rogers & Wiley Post Mem.	1	1	2	1	2	4	1	2	2	3	2	6
85	Barrow, Browerville, Elson Lag.	2	3	4	3	4	7	3	3	5	5	5	10
88	Cape Simpson, Piasuk River	-	-	-	-	-	-	-	-	-	-	1	-

Table A.2-36. 360 Days-(Summer LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
3	Mys Florens, Gusinaya	1	-	-	1	-	-	-	-	-	-	-	-
4	Mys Ushakova, Laguna Drem-Khed	1	-	1	1	-	-	1	-	1	-	-	-
5	Mys Evans	1	1	1	1	-	1	1	-	1	-	1	-
6	Ostrov Mushtakova	2	1	1	1	-	1	1	-	1	-	1	1
7	Kosa Bruch	2	1	1	1	1	1	2	1	1	-	1	1
8	E. Wrangel Island, Skeletov	1	1	1	1	1	1	1	-	1	-	1	1
21	Laguna Pil'khikay, Pil'khikay	-	1	-	-	-	-	1	-	-	-	-	-
22	Rypkarpyy, Mys Shmidta	-	1	1	1	1	1	1	1	1	1	1	-
23	Emuem, Tenkergin	-	1	-	-	1	1	1	1	1	1	-	-
24	LS 24	1	1	1	-	1	1	1	1	1	1	1	-
25	Laguna Amguema, Yulinu	1	1	1	1	1	1	1	1	1	1	1	1
26	Ekugvaam, Kepin, Pil'khin	1	1	1	1	1	1	1	1	1	1	-	-
27	Laguna Nut, Rigol'	1	1	1	1	1	1	1	1	1	1	1	1
28	Vankarem,Vankarem Laguna	1	1	1	1	1	1	1	1	1	1	1	1
29	Mys Onman, Vel'may	-	1	1	1	1	1	1	1	1	1	-	1
30	Nutepynmin, Pyngopil'gyn	1	1	1	1	1	1	1	2	1	1	1	1
31	Alyatki, Zaliv Tasytkhin	1	1	1	1	1	1	1	2	1	1	1	1
32	Mys Dzhenretlen, Eynenekvyk	1	1	1	1	1	1	1	1	1	1	-	1
33	Neskan, Laguna Neskan	1	1	1	-	1	1	1	1	1	1	-	-
34	Tepken, Memino	-	1	1	-	1	1	1	1	1	1	-	-
35	Enurmino, Mys Neten	-	1	1	-	1	1	1	1	1	1	-	-
36	Mys Serdtse-Kamen	-	-	-	-	1	-	-	1	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	1	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	2	1	-	4	-	1	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	1	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	1	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	1	-	-	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
71	Kukpowruk River, Sitkok Point	-	-	-	-	1	-	-	1	-	1	-	-
72	Point Lay, Siksrikpak Point	-	1	-	-	1	-	-	2	-	4	-	-
73	Tungaich Point, Tungak Creek	-	1	-	-	1	1	1	1	-	4	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	1	-	-	2	1	1	1	-	3	-	-
75	Akeonik, Icy Cape	-	1	1	-	2	1	1	1	1	3	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	1	1	-	1	-	2	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	1	1	-	1	-	1	-	-
78	Point Collie, Sigeakruk Point	-	1	1	-	2	2	1	1	1	3	-	1
79	Point Belcher, Wainwright	1	2	2	1	4	4	2	3	3	6	1	4
80	Eluksingiak Point, Kugrua Bay	1	1	1	1	2	3	1	2	2	3	-	4
81	Peard Bay, Point Franklin	-	-	-	-	-	1	-	-	1	1	-	1
82	Skull Cliff	-	-	-	-	-	1	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	1	1	-	-	1	1	1	1
84	Will Rogers & Wiley Post Mem.	1	1	2	1	2	4	1	2	2	3	2	6
85	Barrow, Browerville, Elson Lag.	2	3	4	3	4	7	3	3	5	5	5	10
88	Cape Simpson, Piasuk River	-	-	-	-	-	-	-	-	-	-	1	-

Tables A.2-37 through A.2-42 represent summer conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain group of land segments:

Table A.2-37. 3 Days-(Summer GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
143	WAH Insect Relief	-	-	-	-	-	-	-	1	-	-	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	-	-	-	1	-	-	-	-
145	Cape Lisburne	-	-	-	-	-	-	-	2	-	-	-	-
146	Ledyard Bay	-	-	-	-	-	-	-	2	-	-	-	-
147	Point Lay Haulout	-	-	-	-	-	-	-	-	-	8	-	-
148	Kasegaluk Brown Bears	-	-	-	-	-	1	-	-	-	6	-	-
149	National Petroleum Reserve Alaska	-	-	-	-	-	1	-	-	-	-	-	4
151	Kuk River	-	-	-	-	-	1	-	-	-	1	-	2
152	TCH Insect Relief/Calving	-	-	-	-	-	-	-	-	-	-	-	2
176	United States Chukchi Coast	-	-	-	-	1	2	-	2	-	11	-	9
177	United States Beaufort Coast	-	-	-	-	-	-	-	-	-	-	-	3

Table A.2-38. 10 Days-(Summer GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	1	-	-	-	-	-	-	-	-	-	-	-
135	Kolyuchin Bay	-	-	-	-	-	-	-	1	-	-	-	-
143	WAH Insect Relief	-	-	-	-	1	-	-	2	-	-	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	-	-	2	-	1	-	-
145	Cape Lisburne	-	-	-	-	1	-	-	3	-	2	-	-
146	Ledyard Bay	-	-	-	-	2	-	-	5	-	2	-	-
147	Point Lay Haulout	-	1	-	-	3	1	-	3	-	10	-	-
148	Kasegaluk Brown Bears	-	1	1	-	4	2	1	3	1	11	-	1
149	National Petroleum Reserve Alaska	-	1	1	-	2	4	1	1	2	5	1	7
150	Kasegaluk Lagoon Special Use Area	-	-	-	-	1	1	-	-	-	2	-	1
151	Kuk River	-	1	1	-	3	3	1	2	2	6	-	4
152	TCH Insect Relief/Calving	-	-	1	-	1	2	-	-	1	1	1	4
174	Russia Chukchi Coast Marine Mammals	1	2	-	-	1	-	1	2	-	-	-	-
175	Russia Chukchi Coast	1	2	-	-	1	-	1	2	-	-	-	-
176	United States Chukchi Coast	1	3	3	1	12	11	3	13	5	28	2	16
177	United States Beaufort Coast	-	-	1	1	1	4	-	-	2	2	3	7

Table A.2-39. 30 Days-(Summer GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	5	4	4	3	1	1	5	1	3	1	2	1
135	Kolyuchin Bay	1	4	2	1	4	2	4	5	2	3	1	1
136	Ostrov Idlidlya	1	2	1	-	2	1	2	2	1	1	-	-
137	Mys Serditse Kamen	-	1	1	-	2	1	1	2	1	1	-	-
138	Chukota Coast Haulout	-	1	1	-	3	1	1	3	1	2	-	1
143	WAH Insect Relief	-	-	-	-	2	-	-	3	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	2	1	-	4	-	1	-	-
145	Cape Lisburne	-	1	-	-	3	1	1	4	-	3	-	1
146	Ledyard Bay	-	1	-	-	4	1	1	7	1	4	-	-
147	Point Lay Haulout	-	2	1	-	5	2	2	5	1	12	-	1
148	Kasegaluk Brown Bears	1	2	2	1	6	4	2	5	2	13	1	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
149	National Petroleum Reserve Alaska	1	3	3	3	5	7	2	4	5	8	4	10
150	Kasegaluk Lagoon Special Use Area	-	1	1	-	2	1	1	1	1	3	-	1
151	Kuk River	1	3	3	1	5	5	3	4	4	8	1	5
152	TCH Insect Relief/Calving	1	1	2	1	3	4	1	2	3	3	2	7
153	Smith Bay Spotted Seal Haulout	-	-	-	-	-	-	-	-	-	-	1	-
154	Teshekpuk Lake Special Use Area	-	-	-	-	-	-	-	-	-	-	1	1
174	Russia Chukchi Coast Marine Mammals	11	19	13	8	16	10	18	19	12	11	7	6
175	Russia Chukchi Coast	12	19	13	8	16	10	18	20	12	12	7	7
176	United States Chukchi Coast	4	10	9	4	23	19	9	24	12	38	5	21
177	United States Beaufort Coast	2	3	4	4	4	7	3	3	6	5	7	12

Table A.2-40. 60 Days-(Summer GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	7	5	5	5	2	2	6	2	4	1	4	2
135	Kolyuchin Bay	2	4	3	1	4	2	4	5	3	3	1	1
136	Ostrov Idlidlya	1	2	1	1	2	1	2	2	1	1	-	-
137	Mys Serditse Kamen	-	1	1	-	2	1	1	2	1	1	-	-
138	Chukota Coast Haulout	1	1	1	1	3	1	1	4	1	2	-	1
143	WAH Insect Relief	-	-	-	-	2	-	-	3	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	2	1	-	4	-	1	-	-
145	Cape Lisburne	-	1	-	-	3	1	1	4	-	3	-	1
146	Ledyard Bay	-	1	1	-	4	1	1	7	1	4	-	-
147	Point Lay Haulout	-	2	1	-	5	2	2	6	1	12	1	1
148	Kasegaluk Brown Bears	1	3	2	1	6	4	2	5	2	13	1	1
149	National Petroleum Reserve Alaska	2	3	4	3	5	7	3	4	5	8	4	10
150	Kasegaluk Lagoon Special Use Area	-	1	1	-	2	1	1	1	1	3	-	1
151	Kuk River	1	3	3	1	6	5	3	4	4	8	1	5
152	TCH Insect Relief/Calving	1	2	2	1	3	4	2	2	3	4	3	7
153	Smith Bay Spotted Seal Haulout	-	-	-	-	-	-	-	-	-	-	1	-
154	Teshekpuk Lake Special Use Area	-	-	-	-	-	1	-	-	-	-	1	1
174	Russia Chukchi Coast Marine Mammals	14	21	15	11	17	12	20	20	15	12	10	8
175	Russia Chukchi Coast	16	22	17	13	18	13	22	21	16	13	12	10
176	United States Chukchi Coast	5	11	10	5	24	20	10	25	13	38	6	21
177	United States Beaufort Coast	2	3	5	4	5	8	3	3	6	5	7	12

Table A.2-41. 180 Days-(Summer GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	8	6	6	5	2	3	7	2	5	2	5	3
135	Kolyuchin Bay	2	5	3	2	5	2	4	5	3	3	2	1
136	Ostrov Idlidlya	1	2	2	1	2	1	2	2	2	1	1	-
137	Mys Serditse Kamen	-	1	1	-	2	1	1	2	1	1	-	-
138	Chukota Coast Haulout	1	1	1	1	3	1	1	4	1	2	1	1
143	WAH Insect Relief	-	-	-	-	2	-	-	3	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	2	1	-	4	-	1	-	-
145	Cape Lisburne	-	1	-	-	3	1	1	4	-	3	-	1
146	Ledyard Bay	-	1	1	-	4	1	1	7	1	4	-	-
147	Point Lay Haulout	-	2	1	1	5	2	2	6	1	12	1	1
148	Kasegaluk Brown Bears	1	3	2	1	6	4	3	5	2	13	1	1
149	National Petroleum Reserve Alaska	2	3	4	3	5	8	3	4	5	8	4	10
150	Kasegaluk Lagoon Special Use Area	-	1	1	-	2	1	1	1	1	3	-	1
151	Kuk River	1	3	3	1	6	5	3	4	4	8	1	5
152	TCH Insect Relief/Calving	1	2	2	1	3	4	2	2	3	4	3	7
153	Smith Bay Spotted Seal Haulout	-	-	-	-	-	-	-	-	-	-	1	-
154	Teshekpuk Lake Special Use Area	-	-	-	-	-	1	-	-	-	-	1	1
174	Russia Chukchi Coast Marine Mammals	16	23	18	13	19	14	23	21	17	13	12	10
175	Russia Chukchi Coast	19	25	21	16	20	16	25	22	19	14	15	12
176	United States Chukchi Coast	5	11	10	5	24	20	11	25	13	38	6	21
177	United States Beaufort Coast	2	3	5	4	5	8	3	3	6	5	7	12

Table A.2-42. 360 Days-(Summer GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	8	6	6	5	2	3	7	2	5	2	5	3
135	Kolyuchin Bay	2	5	3	2	5	2	4	5	3	3	2	1
136	Ostrov Idlidlya	1	2	2	1	2	1	2	2	2	1	1	-
137	Mys Serditse Kamen	-	1	1	-	2	1	1	2	1	1	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
138	Chukota Coast Haulout	1	1	1	1	3	1	1	4	1	2	1	1
143	WAH Insect Relief	-	-	-	-	2	-	-	3	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	2	1	-	4	-	1	-	-
145	Cape Lisburne	-	1	-	-	3	1	1	4	-	3	-	1
146	Ledyard Bay	-	1	1	-	4	1	1	7	1	4	-	-
147	Point Lay Haulout	-	2	1	1	5	2	2	6	1	12	1	1
148	Kasegaluk Brown Bears	1	3	2	1	6	4	3	5	2	13	1	1
149	National Petroleum Reserve Alaska	2	3	4	3	5	8	3	4	5	8	4	10
150	Kasegaluk Lagoon Special Use Area	-	1	1	-	2	1	1	1	1	3	-	1
151	Kuk River	1	3	3	1	6	5	3	4	4	8	1	5
152	TCH Insect Relief/Calving	1	2	2	1	3	4	2	2	3	4	3	7
153	Smith Bay Spotted Seal Haulout	-	-	-	-	-	-	-	-	-	-	1	-
154	Teshekpuk Lake Special Use Area	-	-	-	-	-	1	-	-	-	-	1	1
174	Russia Chukchi Coast Marine Mammals	16	23	19	13	19	14	23	21	18	13	12	10
175	Russia Chukchi Coast	19	25	21	16	20	16	25	22	19	14	15	12
176	United States Chukchi Coast	5	11	10	5	24	20	11	25	13	38	6	21
177	United States Beaufort Coast	2	3	5	4	5	8	3	4	6	5	7	12

Tables A.2-43 through A.2-48 represent summer conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain boundary segment within:

Table A.2-43. 3 Days-(Summer BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9

Note: All rows have all values less than 0.5 percent and are not shown.

Table A.2-44. 10 Days-(Summer BS

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9

Note: All rows have all values less than 0.5 percent and are not shown.

Table A.2-45. 30 Days-(Summer BS)

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
5	Chukchi Sea	-	1	-	-	-	-	1	-	-	-	-	-
6	Chukchi Sea	1	1	1	1	-	-	1	-	1	-	1	-
7	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
8	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
13	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
14	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
17	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
18	Chukchi Sea	2	-	-	2	-	-	-	-	-	-	1	1
19	Chukchi Sea	1	-	-	2	-	-	-	-	-	-	1	1
20	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-

Table A.2-46. 60 Days-(Summer BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
3	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
4	Chukchi Sea	1	-	-	-	-	-	-	1	-	-	-	-
5	Chukchi Sea	1	1	1	1	1	1	1	1	1	-	-	-
6	Chukchi Sea	2	2	2	2	-	1	2	-	1	-	1	1
7	Chukchi Sea	3	1	1	1	-	-	1	-	1	-	-	-
8	Chukchi Sea	2	-	-	1	-	-	-	-	-	-	1	-
9	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
10	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
11	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
12	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
13	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
14	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
15	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
16	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
17	Chukchi Sea	3	-	1	2	-	1	-	-	-	-	2	1
18	Chukchi Sea	4	1	2	4	-	2	1	-	1	-	3	3
19	Chukchi Sea	3	1	1	3	-	1	1	-	1	-	3	2
20	Chukchi Sea	1	-	1	1	-	-	-	-	-	-	1	1
21	Chukchi Sea	1	-	-	1	-	-	1	-	-	-	1	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
22	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
25	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	-	-

Table A.2-47. 180 Days-(Summer BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
3	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
4	Chukchi Sea	1	-	-	1	1	-	-	1	-	-	-	-
5	Chukchi Sea	2	1	1	1	1	1	1	1	1	1	1	1
6	Chukchi Sea	3	2	2	2	1	1	2	-	2	1	2	1
7	Chukchi Sea	4	2	2	3	-	1	2	-	2	-	3	1
8	Chukchi Sea	3	1	1	1	-	-	1	-	1	-	1	-
9	Chukchi Sea	2	1	1	1	-	-	1	-	1	-	-	-
10	Chukchi Sea	2	-	-	1	-	-	1	-	-	-	-	-
11	Chukchi Sea	2	-	1	1	-	-	1	-	-	-	1	-
12	Chukchi Sea	1	-	1	1	-	-	-	-	-	-	-	-
13	Chukchi Sea	1	-	1	1	-	-	1	-	-	-	-	-
14	Chukchi Sea	1	1	1	1	-	-	1	-	1	-	1	-
15	Chukchi Sea	1	1	1	1	-	-	1	-	1	-	1	1
16	Chukchi Sea	1	-	1	1	-	1	-	-	1	-	1	1
17	Chukchi Sea	3	1	1	3	-	1	1	-	1	1	3	2
18	Chukchi Sea	5	2	3	5	1	3	2	1	3	1	4	4
19	Chukchi Sea	4	1	2	4	1	2	1	1	2	1	3	3
20	Chukchi Sea	1	1	1	2	-	1	1	-	1	-	1	1
21	Chukchi Sea	1	-	1	1	-	-	1	-	-	-	1	-
22	Chukchi Sea	1	-	1	1	-	-	-	-	-	-	1	-
23	Beaufort Sea	-	-	-	-	-	-	-	-	-	-	-	1
24	Beaufort Sea	-	-	1	1	-	-	-	-	1	-	1	1
25	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	1	-
26	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	1	-

Table A.2-48. 360 Days-(Summer BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
3	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	1	-
4	Chukchi Sea	1	-	-	1	1	-	-	1	-	-	-	-
5	Chukchi Sea	2	1	1	1	1	1	1	1	1	1	1	1
6	Chukchi Sea	3	2	2	2	1	2	2	-	2	1	2	2
7	Chukchi Sea	4	2	2	3	-	1	2	-	2	-	3	1
8	Chukchi Sea	3	1	1	1	-	1	1	-	1	-	1	-
9	Chukchi Sea	2	1	1	1	-	-	1	-	1	-	-	-
10	Chukchi Sea	2	-	-	1	-	-	1	-	-	-	-	-
11	Chukchi Sea	2	-	1	1	-	-	1	-	-	-	1	-
12	Chukchi Sea	1	-	1	1	-	-	-	-	-	-	-	-
13	Chukchi Sea	1	-	1	1	-	-	1	-	-	-	-	-
14	Chukchi Sea	1	1	1	1	-	-	1	-	1	-	1	1
15	Chukchi Sea	1	1	1	1	-	1	1	-	1	-	1	1
16	Chukchi Sea	1	-	1	1	-	1	-	-	1	-	1	1
17	Chukchi Sea	3	1	1	3	1	1	1	-	1	1	3	2
18	Chukchi Sea	5	2	3	5	1	3	2	1	3	1	4	4
19	Chukchi Sea	4	1	2	4	1	2	1	1	2	1	4	3
20	Chukchi Sea	1	1	1	2	-	1	1	-	1	-	1	1
21	Chukchi Sea	1	1	1	1	-	-	1	-	-	-	1	-
22	Chukchi Sea	1	-	1	1	-	-	-	-	-	-	1	-
23	Beaufort Sea	-	-	-	-	-	-	-	-	-	-	-	1
24	Beaufort Sea	-	-	1	1	-	-	-	-	1	-	1	1
25	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	1	-
26	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	1	-

Tables A.2-49 through A.2-54 represent winter conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain environmental resource area within:

Table A.2-49. 3 Days-(Winter ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	-	-	-	-	-	-	-	2	-	5	-	4
1	Kasegaluk Lagoon Area	-	-	-	-	-	-	-	-	-	1	-	-
6	Hanna Shoal	-	-	-	9	-	1	-	-	-	-	17	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
10	Ledyard Bay SPEI Critical Habitat Area	-	-	-	-	1	1	-	2	-	8	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	1	-	-	2	-	-	-	-
16	Barrow Canyon	-	-	-	-	-	-	-	-	-	-	-	3
19	Chukchi Spring Lead System	-	-	-	-	3	4	-	4	-	16	-	11
23	Polar Bear Offshore	-	1	1	-	59	24	1	58	2	65	-	5
38	SUA: Pt. Hope - Cape Lisburne	-	-	-	-	-	-	-	3	-	-	-	-
39	SUA: Pt. Lay - Kasegaluk	-	-	-	-	-	-	-	-	-	22	-	1
40	SUA: Icy Cape - Wainwright	-	-	-	-	-	7	-	-	1	7	-	57
41	SUA: Barrow - Chukchi	-	-	-	-	-	-	-	-	-	-	-	1
47	Hanna Shoal Walrus Use Area	-	-	-	8	-	4	-	-	-	-	15	6
48	Chukchi Lead System 4	-	-	-	-	10	15	-	12	1	50	1	37
49	Chukchi Spring Lead 1	-	-	-	-	1	-	-	4	-	-	-	-
50	Pt Lay Walrus Offshore	-	-	-	-	3	1	-	2	-	6	-	1
51	Pt Lay Walrus Nearshore	-	-	-	-	-	-	-	-	-	5	-	-
53	Chukchi Spring Lead 2	-	-	-	-	11	7	-	13	-	22	-	2
54	Chukchi Spring Lead 3	-	-	-	-	-	4	-	-	-	2	-	18
57	Skull Cliffs	-	-	-	-	-	-	-	-	-	-	-	5
62	Herald Shoal Polynya 2	-	4	1	-	-	-	4	-	-	-	-	-
64	Peard Bay Area	-	-	-	-	-	-	-	-	-	-	-	1
70	North Central Chukchi	1	-	-	-	-	-	-	-	-	-	-	-
102	Opilio Crab EFH	-	-	-	-	1	-	-	3	-	-	-	-
103	Saffron Cod EFH	-	-	-	-	3	5	-	13	-	25	1	41
123	AK Chukchi Offshore	3	4	6	2	-	-	2	-	3	-	1	-
124	Central Chukchi Offshore	-	2	1	-	-	-	2	-	-	-	-	-

Table A.2-50. 10 Days-(Winter ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	2	3	2	1	5	6	2	8	2	15	2	14
1	Kasegaluk Lagoon Area	-	-	-	-	-	-	-	-	-	1	-	-
6	Hanna Shoal	1	-	2	14	1	4	-	-	2	1	22	3
10	Ledyard Bay SPEI Critical Habitat Area	-	-	-	-	2	1	-	3	-	9	-	1
11	Wrangel Island 12 nm & Offshore	1	-	-	-	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	1	-	-	3	-	1	-	-
16	Barrow Canyon	-	-	1	1	1	4	-	-	1	2	3	10
18	Murre Rearing and Molting Area	-	-	-	-	1	-	-	2	-	-	-	-
19	Chukchi Spring Lead System	-	-	-	-	6	7	-	6	1	19	1	14
20	East Chukchi Offshore	-	-	-	-	-	-	-	-	-	-	1	-
23	Polar Bear Offshore	-	7	5	1	67	35	5	67	11	76	4	19
30	Beaufort Spring Lead 1	-	-	-	-	-	-	-	-	-	-	-	2
31	Beaufort Spring Lead 2	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	-	-	-	2	-	-	5	-	3	-	-
39	SUA: Pt. Lay - Kasegaluk	-	-	-	-	2	3	-	1	1	26	-	3
40	SUA: Icy Cape - Wainwright	-	1	2	2	5	16	1	3	5	17	6	62
41	SUA: Barrow - Chukchi	-	-	-	-	-	1	-	-	-	1	1	3
46	Wrangel Island 12 nmi Buffer 2	2	-	-	-	-	-	-	-	-	-	-	-
47	Hanna Shoal Walrus Use Area	1	1	2	9	1	5	1	-	2	1	16	9
48	Chukchi Lead System 4	-	2	3	3	19	27	1	18	6	58	8	49
49	Chukchi Spring Lead 1	-	-	-	-	4	1	-	6	-	3	-	-
50	Pt Lay Walrus Offshore	-	-	-	-	4	2	-	3	-	7	-	1
51	Pt Lay Walrus Nearshore	-	-	-	-	-	-	-	-	-	5	-	-
52	Russian Coast Walrus Offshore	-	2	1	-	3	1	1	5	1	2	-	1
53	Chukchi Spring Lead 2	-	-	-	-	14	9	-	15	1	24	-	6
54	Chukchi Spring Lead 3	-	-	1	1	2	7	-	1	2	5	3	21
57	Skull Cliffs	-	-	-	-	1	2	-	-	-	2	1	10
58	Russian Coast Walrus Nearshore	-	-	-	-	1	-	-	1	-	1	-	-
62	Herald Shoal Polynya 2	3	13	7	2	2	3	12	2	6	1	2	1
63	North Chukchi	1	-	-	-	-	-	-	-	-	-	-	-
64	Peard Bay Area	-	-	-	-	-	1	-	-	-	1	-	2
70	North Central Chukchi	2	-	-	-	-	-	-	-	-	-	-	-
74	Offshore Herald Island	3	1	1	1	-	-	1	-	1	-	1	-
91	Hope Sea Valley	1	2	1	1	1	-	2	1	1	-	-	-
102	Opilio Crab EFH	-	-	-	-	6	1	-	9	-	4	-	1
103	Saffron Cod EFH	-	2	3	3	18	19	2	25	6	41	8	51
122	North Chukotka Offshore	-	-	-	-	-	-	1	-	-	-	-	-
123	AK Chukchi Offshore	4	5	8	6	1	2	2	1	5	-	4	1
124	Central Chukchi Offshore	2	6	3	2	1	1	6	1	3	1	1	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-51. 30 Days-(Winter ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	18	29	23	17	34	29	27	38	24	41	19	35
1	Kasegaluk Lagoon Area	-	-	-	-	-	-	-	-	-	1	-	-
4	SUA:Naukan/Russia	-	1	-	-	3	1	-	4	-	2	-	1
6	Hanna Shoal	2	2	5	17	2	7	2	1	5	2	25	8
7	Krill Trap	-	-	-	-	-	-	-	-	-	-	-	1
10	Ledyard Bay SPEI Critical Habitat Area	-	-	-	-	3	2	-	4	-	9	-	1
11	Wrangel Island 12 nm & Offshore	2	1	1	1	-	-	1	-	1	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	1	1	-	3	-	2	-	1
16	Barrow Canyon	1	1	2	4	4	7	1	2	3	4	6	14
18	Murre Rearing and Molting Area	-	2	1	-	6	2	1	7	1	4	-	2
19	Chukchi Spring Lead System	-	1	1	1	8	10	1	8	3	22	3	18
20	East Chukchi Offshore	-	-	-	1	-	-	-	-	-	-	1	1
23	Polar Bear Offshore	3	12	11	7	70	43	10	70	18	78	12	28
30	Beaufort Spring Lead 1	-	-	-	1	1	2	-	1	1	2	1	3
31	Beaufort Spring Lead 2	-	-	-	-	1	1	-	-	-	1	-	2
38	SUA: Pt. Hope - Cape Lisburne	-	1	1	-	4	2	1	6	1	6	-	1
39	SUA: Pt. Lay - Kasegaluk	-	1	1	1	4	5	1	3	2	27	1	5
40	SUA: Icy Cape - Wainwright	2	4	6	5	10	21	3	7	9	23	10	65
41	SUA: Barrow - Chukchi	-	-	-	1	1	2	-	1	1	1	1	5
46	Wrangel Island 12 nmi Buffer 2	9	4	4	4	1	2	5	1	3	-	3	1
47	Hanna Shoal Walrus Use Area	2	3	4	11	3	8	3	2	5	3	18	11
48	Chukchi Lead System 4	3	6	8	9	24	34	5	22	12	62	17	55
49	Chukchi Spring Lead 1	-	-	-	-	6	3	-	8	-	6	-	2
50	Pt Lay Walrus Offshore	-	-	-	-	5	2	-	5	-	8	-	2
51	Pt Lay Walrus Nearshore	-	-	-	-	1	-	-	1	-	6	-	-
52	Russian Coast Walrus Offshore	1	5	2	1	9	3	4	11	2	6	1	2
53	Chukchi Spring Lead 2	-	1	1	-	16	11	1	17	2	26	2	8
54	Chukchi Spring Lead 3	-	1	2	2	5	10	1	4	4	9	5	24
55	Point Barrow, Plover Islands	-	-	-	-	-	-	-	-	-	-	-	1
57	Skull Cliffs	1	-	1	1	2	4	-	1	2	4	3	13
58	Russian Coast Walrus Nearshore	-	1	-	-	3	1	1	4	-	2	-	1
59	Ostrov Kolyuchin	-	-	-	-	-	-	-	1	-	-	-	-
62	Herald Shoal Polynya 2	8	19	13	8	8	8	19	6	12	6	7	6
63	North Chukchi	1	-	-	1	-	-	-	-	-	-	-	-
64	Peard Bay Area	-	-	-	-	1	1	-	1	-	2	-	3
66	Herald Island	1	-	-	-	-	-	-	-	-	-	-	-
70	North Central Chukchi	2	-	-	1	-	-	-	-	-	-	-	-
74	Offshore Herald Island	5	2	2	3	1	1	2	-	2	1	2	1
80	Beaufort Outer Shelf 1	-	-	-	-	-	-	-	-	-	-	-	1
91	Hope Sea Valley	3	3	3	2	2	2	3	2	3	1	2	1
102	Opilio Crab EFH	1	3	2	1	11	5	3	15	3	10	1	4
103	Saffron Cod EFH	3	8	10	9	30	31	8	35	14	52	16	59
121	Cape Lisburne - Pt Hope	-	-	-	-	-	-	-	1	-	-	-	-
122	North Chukotka Offshore	2	2	2	1	1	-	2	-	1	-	1	-
123	AK Chukchi Offshore	5	5	9	7	1	2	3	1	6	1	6	2
124	Central Chukchi Offshore	4	7	5	4	2	3	7	2	5	2	3	2

Table A.2-52. 60 Days-(Winter ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	33	52	44	35	55	49	49	58	46	60	38	51
1	Kasegaluk Lagoon Area	-	-	-	-	-	-	-	-	-	2	-	-
4	SUA:Naukan/Russia	-	2	1	1	4	2	2	6	1	4	1	2
6	Hanna Shoal	3	3	6	19	4	9	3	3	6	4	27	9
7	Krill Trap	-	-	-	-	1	1	-	-	-	1	-	1
10	Ledyard Bay SPEI Critical Habitat Area	-	-	-	-	3	2	-	4	-	10	-	2
11	Wrangel Island 12 nm & Offshore	2	1	1	1	-	-	1	-	1	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	2	1	-	3	-	2	-	1
16	Barrow Canyon	1	2	3	4	5	9	2	4	5	6	7	15
18	Murre Rearing and Molting Area	1	3	2	1	7	4	2	9	2	6	1	3
19	Chukchi Spring Lead System	-	1	2	2	10	12	1	10	4	23	4	19
20	East Chukchi Offshore	-	-	-	1	-	-	-	-	-	-	1	1
23	Polar Bear Offshore	5	14	13	8	71	44	12	71	20	79	14	30
30	Beaufort Spring Lead 1	-	-	1	1	2	2	-	1	1	2	1	4
31	Beaufort Spring Lead 2	-	-	-	-	1	1	-	1	-	1	1	2
32	Beaufort Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	1	1	1	4	2	1	7	2	7	-	1
39	SUA: Pt. Lay - Kasegaluk	1	1	1	1	4	5	1	3	2	28	2	5

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
40	SUA: Icy Cape - Wainwright	3	5	7	7	13	23	5	9	11	25	12	66
41	SUA: Barrow - Chukchi	-	-	-	1	2	2	-	1	1	2	2	5
46	Wrangel Island 12 nmi Buffer 2	13	8	8	8	3	4	9	3	7	3	6	3
47	Hanna Shoal Walrus Use Area	3	6	7	13	7	11	6	6	8	7	19	14
48	Chukchi Lead System 4	4	7	10	11	25	35	7	24	14	62	18	56
49	Chukchi Spring Lead 1	-	1	1	1	7	4	1	9	1	7	1	3
50	Pt Lay Walrus Offshore	-	-	-	-	5	3	-	5	1	9	-	3
51	Pt Lay Walrus Nearshore	-	-	-	-	1	-	-	1	-	6	-	-
52	Russian Coast Walrus Offshore	1	6	3	1	10	5	4	13	3	8	2	4
53	Chukchi Spring Lead 2	-	2	2	1	17	12	1	17	3	27	3	9
54	Chukchi Spring Lead 3	-	3	3	3	7	12	2	6	5	11	6	25
55	Point Barrow, Plover Islands	-	-	-	-	-	1	-	-	-	-	1	1
57	Skull Cliffs	1	1	2	2	2	4	1	2	2	4	3	13
58	Russian Coast Walrus Nearshore	-	1	1	-	3	1	1	5	1	2	1	1
59	Ostrov Kolyuchin	-	-	-	-	-	-	-	1	-	-	-	-
61	Pt Lay-Barrow BH GW SFF	-	1	1	-	1	1	1	1	1	1	-	1
62	Herald Shoal Polynya 2	9	20	16	11	9	11	21	8	15	8	10	9
63	North Chukchi	1	-	-	1	-	-	-	-	-	-	-	-
64	Peard Bay Area	-	-	-	-	2	2	-	1	1	2	-	3
66	Herald Island	1	-	-	-	-	-	-	-	-	-	-	-
70	North Central Chukchi	2	-	-	1	-	-	-	-	-	-	-	-
74	Offshore Herald Island	5	2	2	3	1	1	2	-	2	1	2	1
80	Beaufort Outer Shelf 1	-	-	-	-	-	-	-	-	-	-	-	1
91	Hope Sea Valley	3	4	3	2	2	2	3	2	3	1	2	2
102	Opilio Crab EFH	2	4	3	1	13	6	4	16	4	12	2	5
103	Saffron Cod EFH	5	11	13	12	33	34	11	38	18	55	19	60
107	Pt Hope Offshore	-	-	-	-	-	-	-	1	-	-	-	-
119	AK BFT Outer Shelf&Slope 10	-	-	-	-	1	-	-	1	-	1	-	-
121	Cape Lisburne - Pt Hope	-	-	-	-	1	-	-	1	-	1	-	-
122	North Chukotka Offshore	2	2	2	2	1	1	2	1	1	-	1	-
123	AK Chukchi Offshore	5	5	9	7	1	3	3	1	6	1	6	2
124	Central Chukchi Offshore	4	7	5	4	2	3	7	2	5	2	3	3

Table A.2-53. 180 Days-(Winter ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	41	61	54	45	64	58	59	66	56	67	48	60
1	Kasegaluk Lagoon Area	-	-	-	-	-	-	-	-	-	2	-	-
4	SUA:Naukan/Russia	1	2	1	1	4	2	2	6	1	4	1	2
6	Hanna Shoal	4	6	8	20	6	11	5	5	8	6	29	11
7	Krill Trap	-	1	1	-	1	1	1	1	1	1	-	1
10	Ledyard Bay SPEI Critical Habitat Area	-	-	-	-	3	2	-	4	-	10	-	2
11	Wrangel Island 12 nm & Offshore	3	3	3	2	3	2	3	3	3	2	1	2
15	Cape Lisburne Seabird Colony Area	-	-	-	-	2	1	-	3	-	2	-	1
16	Barrow Canyon	2	3	4	5	6	9	3	5	6	7	7	16
18	Murre Rearing and Molting Area	1	4	3	1	8	5	3	10	3	7	2	4
19	Chukchi Spring Lead System	-	2	2	2	11	12	1	11	4	23	5	19
20	East Chukchi Offshore	-	-	-	1	-	1	-	-	-	-	1	1
23	Polar Bear Offshore	6	14	13	9	71	44	13	71	20	79	14	31
30	Beaufort Spring Lead 1	-	-	1	1	2	3	-	2	1	3	2	4
31	Beaufort Spring Lead 2	-	-	-	-	1	1	-	1	-	2	1	3
32	Beaufort Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	1	1	1	4	2	1	7	2	7	1	2
39	SUA: Pt. Lay - Kasegaluk	1	1	1	1	4	5	1	3	2	28	2	5
40	SUA: Icy Cape - Wainwright	3	6	8	8	14	24	6	10	11	26	13	66
41	SUA: Barrow - Chukchi	-	-	-	1	2	3	-	1	1	2	2	5
42	SUA: Barrow - East Arch	1	1	1	-	1	1	1	1	1	1	1	1
43	SUA: Nuiqsut - Cross Island	-	1	-	-	1	-	1	1	1	1	-	-
46	Wrangel Island 12 nmi Buffer 2	15	9	10	10	4	6	11	4	8	3	8	5
47	Hanna Shoal Walrus Use Area	4	10	10	15	10	14	9	9	11	10	22	17
48	Chukchi Lead System 4	5	7	11	12	26	36	7	24	15	62	19	56
49	Chukchi Spring Lead 1	-	1	1	1	7	4	1	9	1	7	1	3
50	Pt Lay Walrus Offshore	-	-	-	-	5	3	-	5	1	9	1	3
51	Pt Lay Walrus Nearshore	-	-	-	-	1	-	-	1	-	6	-	1
52	Russian Coast Walrus Offshore	2	7	4	2	11	6	5	14	4	8	2	5
53	Chukchi Spring Lead 2	-	2	2	1	17	12	2	18	3	27	3	9
54	Chukchi Spring Lead 3	-	3	4	3	8	13	3	7	6	12	7	26
55	Point Barrow, Plover Islands	-	-	-	1	-	1	-	-	-	-	1	1
56	Hanna Shoal Area	1	2	1	1	2	2	1	2	2	2	2	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
57	Skull Cliffs	1	1	2	2	2	5	1	2	3	4	4	14
58	Russian Coast Walrus Nearshore	1	2	1	1	4	2	1	5	1	3	1	1
59	Ostrov Kolyuchin	-	-	-	-	-	-	-	1	-	-	-	-
61	Pt Lay-Barrow BH GW SFF	1	3	2	1	3	2	2	3	2	3	1	2
62	Herald Shoal Polynya 2	10	21	16	12	10	11	21	8	16	8	11	9
63	North Chukchi	1	-	-	1	-	-	-	-	-	-	-	-
64	Peard Bay Area	-	1	1	-	3	2	1	2	1	3	1	3
66	Herald Island	1	1	1	1	1	1	1	1	1	1	1	-
70	North Central Chukchi	2	-	-	1	-	-	-	-	-	-	-	-
74	Offshore Herald Island	5	2	2	3	1	1	2	-	2	1	2	1
80	Beaufort Outer Shelf 1	-	1	-	-	1	1	-	1	1	1	1	1
82	N Chukotka Nrshr 2	-	-	-	-	-	-	-	1	-	-	-	-
91	Hope Sea Valley	3	4	3	2	2	2	3	2	3	1	2	2
101	Beaufort Outer Shelf 2	-	1	-	-	1	1	-	1	1	1	-	1
102	Opilio Crab EFH	2	4	3	2	13	6	4	16	4	12	2	5
103	Saffron Cod EFH	6	13	14	13	35	35	12	39	19	55	20	61
107	Pt Hope Offshore	-	-	-	-	-	-	-	1	-	-	-	-
109	AK BFT Shelf Edge	-	-	-	-	-	-	-	-	-	1	-	-
110	AK BFT Outer Shelf&Slope 1	-	-	-	-	1	-	-	1	-	1	-	-
111	AK BFT Outer Shelf&Slope 2	-	-	-	-	1	-	-	1	-	1	-	-
112	AK BFT Outer Shelf&Slope 3	-	-	-	-	1	-	-	1	-	1	-	-
113	AK BFT Outer Shelf&Slope 4	-	-	-	-	1	-	-	1	-	1	-	-
114	AK BFT Outer Shelf&Slope 5	-	1	-	-	1	1	-	1	1	1	-	-
115	AK BFT Outer Shelf&Slope 6	-	1	-	-	1	1	1	1	1	1	-	-
116	AK BFT Outer Shelf&Slope 7	-	1	1	-	1	1	1	1	1	1	1	1
117	AK BFT Outer Shelf&Slope 8	-	1	1	-	1	1	1	1	1	1	1	1
118	AK BFT Outer Shelf&Slope 9	-	1	1	-	1	1	1	1	1	1	1	1
119	AK BFT Outer Shelf&Slope 10	1	2	2	1	3	2	2	3	2	2	1	1
121	Cape Lisburne - Pt Hope	-	-	-	-	1	-	-	1	-	1	-	-
122	North Chukotka Offshore	2	2	2	2	1	1	2	1	1	-	1	-
123	AK Chukchi Offshore	5	5	9	7	1	3	3	1	6	1	6	2
124	Central Chukchi Offshore	4	7	5	4	2	3	7	2	5	2	3	3

Table A.2-54. 360 Days-(Winter ERA).

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
0	Land	42	61	54	45	64	59	59	66	56	68	48	60
1	Kasegaluk Lagoon Area	-	-	-	-	-	-	-	-	-	2	-	-
4	SUA:Naukan/Russia	1	2	1	1	4	2	2	6	1	4	1	2
6	Hanna Shoal	4	6	8	20	6	11	5	5	8	6	29	11
7	Krill Trap	-	1	1	-	1	1	1	1	1	1	-	1
10	Ledyard Bay SPEI Critical Habitat Area	-	-	-	-	3	2	-	4	-	10	-	2
11	Wrangel Island 12 nm & Offshore	3	3	3	2	3	2	3	3	3	2	2	2
15	Cape Lisburne Seabird Colony Area	-	-	-	-	2	1	-	3	-	2	-	1
16	Barrow Canyon	2	3	4	5	6	9	3	5	6	7	7	16
18	Murre Rearing and Molting Area	1	4	3	1	8	5	3	10	3	7	2	4
19	Chukchi Spring Lead System	-	2	2	2	11	12	1	11	4	23	5	19
20	East Chukchi Offshore	-	-	-	1	-	1	-	-	-	-	1	1
23	Polar Bear Offshore	6	14	13	9	71	44	13	71	20	79	14	31
30	Beaufort Spring Lead 1	-	-	1	1	2	3	-	2	1	3	2	4
31	Beaufort Spring Lead 2	-	-	-	-	1	1	-	1	-	2	1	3
32	Beaufort Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	1
38	SUA: Pt. Hope - Cape Lisburne	-	1	1	1	4	2	1	7	2	7	1	2
39	SUA: Pt. Lay - Kasegaluk	1	1	1	1	4	5	1	3	2	28	2	5
40	SUA: Icy Cape - Wainwright	3	6	8	8	14	24	6	10	11	26	13	66
41	SUA: Barrow - Chukchi	-	-	-	1	2	3	-	1	1	2	2	5
42	SUA: Barrow - East Arch	1	1	1	-	1	1	1	1	1	1	1	1
43	SUA: Nuiqsut - Cross Island	-	1	-	-	1	-	1	1	1	1	-	-
46	Wrangel Island 12 nmi Buffer 2	15	9	10	10	4	6	11	4	8	3	8	5
47	Hanna Shoal Walrus Use Area	4	10	10	15	10	15	9	9	11	10	22	17
48	Chukchi Lead System 4	5	7	11	12	26	36	7	24	15	62	19	56
49	Chukchi Spring Lead 1	-	1	1	1	7	4	1	9	1	7	1	3
50	Pt Lay Walrus Offshore	-	-	-	-	5	3	-	5	1	9	1	3
51	Pt Lay Walrus Nearshore	-	-	-	-	1	-	-	1	-	6	-	1
52	Russian Coast Walrus Offshore	2	7	4	2	11	6	5	14	4	8	2	5
53	Chukchi Spring Lead 2	-	2	2	1	17	12	2	18	3	27	3	9
54	Chukchi Spring Lead 3	-	3	4	3	8	13	3	7	6	12	7	26
55	Point Barrow, Plover Islands	-	-	-	1	-	1	-	-	-	-	1	1
56	Hanna Shoal Area	1	2	1	1	2	2	1	2	2	2	2	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Environmental Resource Area Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
57	Skull Cliffs	1	1	2	2	2	5	1	2	3	4	4	14
58	Russian Coast Walrus Nearshore	1	2	1	1	4	2	1	5	1	3	1	1
59	Ostrov Kolyuchin	-	-	-	-	-	-	-	1	-	-	-	-
61	Pt Lay-Barrow BH GW SFF	1	3	2	1	3	2	2	4	2	3	1	2
62	Herald Shoal Polynya 2	10	21	16	12	10	11	21	8	16	8	11	9
63	North Chukchi	1	-	-	1	-	-	-	-	-	-	-	-
64	Peard Bay Area	-	1	1	-	3	2	1	2	1	3	1	3
66	Herald Island	1	1	1	1	1	1	1	1	1	1	1	-
70	North Central Chukchi	2	-	-	1	-	1	-	-	-	1	-	-
74	Offshore Herald Island	5	2	2	3	1	1	2	1	2	1	2	1
80	Beaufort Outer Shelf 1	-	1	-	-	1	1	-	1	1	1	1	1
82	N Chukotka Nrshr 2	-	-	-	-	-	-	-	1	-	-	-	-
91	Hope Sea Valley	3	4	3	2	2	2	4	2	3	1	2	2
101	Beaufort Outer Shelf 2	-	1	-	-	1	1	-	1	1	1	-	1
102	Opilio Crab EFH	2	4	3	2	13	6	4	16	4	12	2	5
103	Saffron Cod EFH	6	13	14	13	35	35	12	39	19	55	20	61
107	Pt Hope Offshore	-	-	-	-	-	-	-	1	-	-	-	-
109	AK BFT Shelf Edge	-	-	-	-	-	-	-	-	-	1	-	-
110	AK BFT Outer Shelf&Slope 1	-	-	-	-	1	-	-	1	-	1	-	-
111	AK BFT Outer Shelf&Slope 2	-	-	-	-	1	-	-	1	-	1	-	-
112	AK BFT Outer Shelf&Slope 3	-	-	-	-	1	-	-	1	-	1	-	-
113	AK BFT Outer Shelf&Slope 4	-	-	-	-	1	-	-	1	-	1	-	-
114	AK BFT Outer Shelf&Slope 5	-	1	-	-	1	1	-	1	1	1	-	-
115	AK BFT Outer Shelf&Slope 6	-	1	1	-	1	1	1	1	1	1	-	-
116	AK BFT Outer Shelf&Slope 7	-	1	1	-	1	1	1	1	1	1	1	1
117	AK BFT Outer Shelf&Slope 8	-	1	1	1	1	1	1	1	1	1	1	1
118	AK BFT Outer Shelf&Slope 9	-	1	1	1	1	1	1	1	1	1	1	1
119	AK BFT Outer Shelf&Slope 10	1	2	2	1	3	2	2	3	2	2	1	1
121	Cape Lisburne - Pt Hope	-	-	-	-	1	-	-	1	-	1	-	-
122	North Chukotka Offshore	2	2	2	2	1	1	2	1	1	-	1	-
123	AK Chukchi Offshore	5	5	9	7	1	3	3	1	6	1	6	2
124	Central Chukchi Offshore	4	7	5	4	2	3	7	2	5	2	3	3

Tables A.2-55 through A.2-60 represent winter conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain land segment within:

Table A.2-55. 3 Days-(Winter LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	1	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	2	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	1	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	1	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	-	1
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	-	1

Table A.2-56. 10 Days-(Winter LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	1	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	1	-	-	2	-	2	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	1	-	1	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	2	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	2	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	2	-	-
75	Akeonik, Icy Cape	-	-	-	-	-	-	-	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	-	1
78	Point Collie, Sigeakruk Point	-	-	-	-	-	-	-	-	-	-	-	1
79	Point Belcher, Wainwright	-	-	-	-	-	1	-	-	-	1	-	3
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	1	-	-	-	-	-	3
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	1	-	-	-	-	1	2
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	1	-	-	-	-	1	2

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-57. 30 Days-(Winter LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
5	Mys Evans	1	-	-	-	-	-	-	-	-	-	-	-
6	Ostrov Mushtakova	1	-	-	-	-	-	1	-	-	-	-	-
7	Kosa Bruch	2	1	1	1	-	-	1	-	1	-	1	-
8	E. Wrangel Island, Skeletov	2	1	1	1	-	-	1	-	1	-	-	-
20	Polyarnyy, Pil'gyn	-	1	1	-	-	-	1	-	-	-	-	-
21	Laguna Pil'khikay, Pil'khikay	-	1	1	-	-	-	1	-	1	-	-	-
22	Rypkarpyy, Mys Shmidta	1	1	1	1	-	-	1	-	1	-	1	-
23	Emuem, Tenkergin	1	1	1	1	-	-	1	-	1	-	-	-
24	LS 24	1	1	1	-	-	-	1	-	1	-	-	-
25	Laguna Amguema, Yulinu	1	1	1	1	1	1	1	1	1	-	1	-
26	Ekugvaam, Kepin, Pil'khin	1	1	1	1	1	1	1	1	1	1	1	-
27	Laguna Nut, Rigol'	1	2	1	1	1	1	1	1	1	1	1	1
28	Vankarem,Vankarem Laguna	1	2	1	1	1	1	2	1	1	1	1	1
29	Mys Onman, Vel'may	1	2	1	1	1	1	1	2	1	1	1	1
30	Nutepynmin, Pyngopil'gyn	1	2	1	1	2	2	2	3	2	1	1	1
31	Alyatki, Zaliv Tasytkhin	1	2	1	1	3	2	2	3	1	2	1	1
32	Mys Dzhenretlen, Eynenekvyk	-	1	1	1	2	1	1	2	1	1	1	1
33	Neskan, Laguna Neskan	-	1	1	-	2	1	1	2	1	1	-	1
34	Tepken, Memino	-	1	1	-	2	1	1	2	1	1	-	1
35	Enurmino, Mys Neten	-	1	1	-	2	1	1	2	1	1	-	1
36	Mys Serdtse-Kamen	-	1	-	-	2	1	1	2	1	2	-	1
37	Chegitun, Utkan	-	-	-	-	1	1	-	2	-	1	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	1	-	-	1	-	1	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	1	-	-	1	-	1	-	-
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	1	1	-	3	-	3	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	2	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	2	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	1	-	-	-	2	-	-
75	Akeonik, Icy Cape	-	-	-	-	-	1	-	-	-	2	-	1
76	Avak Inlet, Tunalik River	-	-	-	-	-	1	-	-	-	1	-	1
78	Point Collie, Sigeakruk Point	-	-	-	-	-	1	-	-	-	1	-	1
79	Point Belcher, Wainwright	-	-	-	-	1	2	-	-	1	2	1	4
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	1	-	-	-	1	-	3
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	-	-	1	-	1	-	-	-	1	1	3
85	Barrow, Browerville, Elson Lag.	-	-	-	1	1	2	-	-	1	1	2	4

Table A.2-58. 60 Days-(Winter LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
5	Mys Evans	1	-	-	-	-	-	-	-	-	-	-	-
6	Ostrov Mushtakova	2	1	1	1	-	-	1	-	1	-	1	-
7	Kosa Bruch	2	1	1	1	-	1	1	-	1	-	1	1
8	E. Wrangel Island, Skeletov	2	2	2	1	1	1	2	-	1	1	1	1
9	Mys Proletarskiy	1	1	1	1	-	-	1	-	1	-	-	1
10	Bukhta Davidova	1	1	-	-	-	-	1	-	-	-	-	-
17	Mys Yakan	-	-	1	-	-	-	-	-	-	-	-	-
18	Pil'khikay, Laguna Rypil'khin	-	-	1	-	-	-	1	-	1	-	-	-
19	Laguna Kuepil'khin, Leningradskiy	1	1	1	1	-	-	1	-	1	-	1	-
20	Polyarnyy, Pil'gyn	1	1	1	1	-	-	1	-	1	-	1	-
21	Laguna Pil'khikay, Pil'khikay	1	1	1	1	1	1	1	1	1	-	1	-
22	Rypkarpyy, Mys Shmidta	2	2	2	1	1	1	2	1	1	1	1	1
23	Emuem, Tenkergin	1	2	1	1	1	1	2	1	1	1	1	-
24	LS 24	1	2	2	1	1	1	2	1	2	1	1	1
25	Laguna Amguema, Yulinu	1	2	2	1	1	1	2	1	2	1	1	1
26	Ekugvaam, Kepin, Pil'khin	1	2	2	1	2	1	2	2	2	1	1	1
27	Laguna Nut, Rigol'	1	3	2	2	2	2	2	2	2	2	1	1
28	Vankarem,Vankarem Laguna	1	3	2	2	2	2	3	2	2	2	2	2
29	Mys Onman, Vel'may	1	3	2	1	2	2	2	3	2	2	2	1
30	Nutepynmin, Pyngopil'gyn	1	3	2	2	4	3	3	4	3	3	2	2
31	Alyatki, Zaliv Tasytkhin	1	3	2	2	4	3	3	5	2	4	3	2
32	Mys Dzhenretlen, Eynenekvyk	1	2	2	1	3	2	2	3	2	2	1	2
33	Neskan, Laguna Neskan	1	2	2	1	3	2	2	3	2	2	1	2

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
34	Tepken, Memino	1	2	1	1	3	2	2	3	2	2	1	2
35	Enurmino, Mys Neten	1	2	1	1	3	2	2	3	1	2	1	1
36	Mys Serdtse-Kamen	-	2	1	-	3	2	1	4	1	3	1	1
37	Chegitun, Utkan	-	1	1	-	2	1	1	3	1	2	-	1
38	Enmytagyn, Inchoun, Mitkulen	-	1	-	-	2	1	1	2	-	1	-	1
39	Cape Dezhnev, Naukan, Uelen	-	1	-	-	2	1	1	2	-	2	-	1
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	1	1	-	3	1	3	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	2	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	2	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	1	-	-	-	2	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	-	-	2	-	1
76	Avak Inlet, Tunalik River	-	-	-	-	-	1	-	-	-	1	-	1
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	-	-	1
78	Point Collie, Sigeakruk Point	-	-	-	-	-	1	-	-	-	1	-	1
79	Point Belcher, Wainwright	-	-	1	-	1	2	-	1	1	2	1	4
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	1	-	-	-	1	-	3
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	1	2
84	Will Rogers & Wiley Post Mem.	-	-	-	1	1	1	-	-	1	1	1	3
85	Barrow, Browerville, Elson Lag.	-	-	1	1	1	2	-	1	1	1	2	4

Table A.2-59. 180 Days-(Winter LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Mys Blossom, Laguna Vaygach	-	1	-	-	-	-	1	-	-	-	-	-
3	Mys Florens, Gusinaya	1	-	-	-	-	-	-	-	-	-	-	-
4	Mys Ushakova, Laguna Drem-Khed	1	-	-	-	-	-	-	-	-	-	-	-
5	Mys Evans	1	1	1	1	-	-	1	-	1	-	1	-
6	Ostrov Mushtakova	2	1	1	1	-	1	1	-	1	1	1	1
7	Kosa Bruch	2	1	2	2	1	1	2	1	1	1	1	1
8	E. Wrangel Island, Skeletov	2	2	2	2	1	1	2	1	2	1	2	1
9	Mys Proletarskiy	1	1	1	1	1	1	1	1	1	1	1	1
10	Bukhta Davidova	1	1	1	1	1	1	1	1	1	1	-	-
12	Bukhta Predatel'skaya	-	1	1	-	1	-	1	1	1	-	-	-
15	Billings, Laguna Adtaynung	1	-	-	-	-	-	1	-	-	-	-	-
16	Mys Enmytagyn	-	-	-	-	-	-	1	-	-	-	-	-
17	Mys Yakan	1	1	1	1	-	-	1	-	-	-	-	-
18	Pil'khikay, Laguna Rypil'khin	1	1	1	1	-	-	1	-	1	-	-	-
19	Laguna Kuepil'khin, Leningradskiy	1	1	1	1	-	-	1	-	1	-	1	-
20	Polyarnyy, Pil'gyn	1	1	1	1	1	1	1	-	1	-	1	1
21	Laguna Pil'khikay, Pil'khikay	1	1	1	1	1	1	1	1	1	-	1	1
22	Rypkarpyy, Mys Shmidta	2	2	2	2	1	1	2	1	2	1	1	1
23	Emuem, Tenkergin	2	2	2	2	1	1	2	1	2	1	1	1
24	LS 24	1	2	2	1	1	1	2	1	2	1	2	1
25	Laguna Amguema, Yulinu	1	2	2	2	1	2	2	1	2	1	2	1
26	Ekugvaam, Kepin, Pil'khin	1	3	2	2	2	2	3	2	2	1	1	2
27	Laguna Nut, Rigol'	1	3	2	2	2	2	2	2	3	2	2	2
28	Vankarem,Vankarem Laguna	1	3	2	2	2	2	3	2	3	2	2	2
29	Mys Onman, Vel'may	1	3	2	2	3	2	2	3	3	2	2	2
30	Nutepynmin, Pyngopil'gyn	2	3	3	2	4	3	3	4	3	3	3	2
31	Alyatki, Zaliv Tasytkhin	2	4	3	2	5	4	4	5	3	4	3	3
32	Mys Dzhenretlen, Eynenekvyk	1	3	2	1	3	2	3	3	2	3	2	2
33	Neskan, Laguna Neskan	1	3	2	1	3	2	2	3	2	2	1	2
34	Tepken, Memino	1	3	2	1	3	2	2	3	2	2	1	2
35	Enurmino, Mys Neten	1	2	1	1	3	2	2	3	2	3	1	2
36	Mys Serdtse-Kamen	1	2	1	1	3	2	2	4	1	3	1	2
37	Chegitun, Utkan	-	1	1	-	2	1	1	3	1	2	1	1
38	Enmytagyn, Inchoun, Mitkulen	-	1	-	-	2	1	1	2	1	1	-	1
39	Cape Dezhnev, Naukan, Uelen	-	1	-	-	2	1	1	2	-	2	-	1
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	1	1	-	3	1	3	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	2	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	2	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	1	-	-	-	2	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	-	-	2	-	1
76	Avak Inlet, Tunalik River	-	-	-	-	-	1	-	-	-	1	-	1
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	-	-	1
78	Point Collie, Sigeakruk Point	-	-	-	-	-	1	-	-	-	1	-	1
79	Point Belcher, Wainwright	-	-	1	1	1	2	-	1	1	2	1	4
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	1	-	-	-	1	1	3
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	1	-	-	-	-	1	2
84	Will Rogers & Wiley Post Mem.	-	-	1	1	1	1	-	-	1	1	2	3
85	Barrow, Browerville, Elson Lag.	-	1	1	2	1	2	1	1	1	2	2	4
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	-	-	-	-	1	1

Table A.2-60. 360 Days-(Winter LS).

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Mys Blossom, Laguna Vaygach	-	1	-	-	-	-	1	-	-	-	-	-
3	Mys Florens, Gusinaya	1	-	-	-	-	-	-	-	-	-	-	-
4	Mys Ushakova, Laguna Drem-Khed	1	-	-	-	-	-	-	-	-	-	-	-
5	Mys Evans	1	1	1	1	-	-	1	-	1	-	1	-
6	Ostrov Mushtakova	2	1	1	1	-	1	1	-	1	1	1	1
7	Kosa Bruch	2	1	2	2	1	1	2	1	1	1	1	1
8	E. Wrangel Island, Skeletov	2	2	2	2	1	1	2	1	2	1	2	1
9	Mys Proletarskiy	1	1	1	1	1	1	1	1	1	1	1	1
10	Bukhta Davidova	1	1	1	1	1	1	1	1	1	1	-	-
12	Bukhta Predatel'skaya	-	1	1	-	1	-	1	1	1	-	-	-
15	Billings, Laguna Adtaynung	1	-	-	-	-	-	1	-	-	-	-	-
16	Mys Enmytagyn	-	-	-	-	-	-	1	-	-	-	-	-
17	Mys Yakan	1	1	1	1	-	-	1	-	-	-	-	-
18	Pil'khikay, Laguna Rypil'khin	1	1	1	1	-	-	1	-	1	-	-	-
19	Laguna Kuepil'khin, Leningradskiy	1	1	1	1	-	-	1	-	1	-	1	-
20	Polyarnyy, Pil'gyn	1	1	1	1	1	1	1	-	1	-	1	1
21	Laguna Pil'khikay, Pil'khikay	1	1	1	1	1	1	1	1	1	-	1	1
22	Rypkarpyy, Mys Shmidta	2	2	2	2	1	1	2	1	2	1	1	1
23	Emuem, Tenkergin	2	2	2	2	1	1	2	1	2	1	1	1
24	LS 24	1	2	2	2	1	1	2	1	2	1	2	1
25	Laguna Amguema, Yulinu	1	2	2	2	1	2	2	1	2	1	2	1
26	Ekugvaam, Kepin, Pil'khin	1	3	2	2	2	2	3	2	2	1	1	2
27	Laguna Nut, Rigol'	1	3	2	2	2	2	2	2	3	2	2	2
28	Vankarem,Vankarem Laguna	1	3	2	2	2	2	3	2	3	2	2	2
29	Mys Onman, Vel'may	1	3	2	2	3	2	2	3	3	2	2	2
30	Nutepynmin, Pyngopil'gyn	2	3	3	2	4	3	3	4	3	3	3	2
31	Alyatki, Zaliv Tasytkhin	2	4	3	2	5	4	4	5	3	4	3	3
32	Mys Dzhenretlen, Eynenekvyk	1	3	2	1	3	2	3	3	2	3	2	2
33	Neskan, Laguna Neskan	1	3	2	1	3	2	2	3	2	2	1	2
34	Tepken, Memino	1	3	2	1	3	2	2	3	2	2	1	2
35	Enurmino, Mys Neten	1	2	1	1	3	2	2	3	2	3	1	2
36	Mys Serdtse-Kamen	1	2	1	1	3	2	2	4	1	3	1	2
37	Chegitun, Utkan	-	1	1	-	2	1	1	3	1	2	1	1
38	Enmytagyn, Inchoun, Mitkulen	-	1	-	-	2	1	1	2	1	1	-	1
39	Cape Dezhnev, Naukan, Uelen	-	1	-	-	2	1	1	2	-	2	-	1
64	Kukpuk River, Point Hope	-	-	-	-	1	-	-	1	-	1	-	-
65	Buckland, Cape Lisburne	-	-	-	-	1	1	-	3	1	3	-	-
66	Ayugatak Lagoon	-	-	-	-	1	-	-	1	-	2	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	1	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	2	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	1	1	-	-	-	2	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	1	-	-	-	2	-	1
76	Avak Inlet, Tunalik River	-	-	-	-	-	1	-	-	-	1	-	1
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	-	-	1
78	Point Collie, Sigeakruk Point	-	-	-	-	-	1	-	-	-	1	-	1
79	Point Belcher, Wainwright	-	-	1	1	1	2	-	1	1	2	1	4
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	1	-	-	-	1	1	3
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1
83	Nulavik, Loran Radio Station	-	-	-	-	-	1	-	-	-	-	1	2
84	Will Rogers & Wiley Post Mem.	-	-	1	1	1	1	-	-	1	1	2	3

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Land Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
85	Barrow, Browerville, Elson Lag.	-	1	1	2	1	2	1	1	1	2	2	4
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	-	-	-	-	1	1

Tables A.2-61 through A.2-66 represent winter conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain group of land segments within:

Table A.2-61. 3 Days-(Winter GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
144	Alaska Maritime Wildlife Refuge	-	-	-	-	-	-	-	1	-	-	-	-
147	Point Lay Haulout	-	-	-	-	-	-	-	-	-	4	-	-
149	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	-	2
151	Kuk River	-	-	-	-	-	-	-	-	-	-	-	1
176	United States Chukchi Coast	-	-	-	-	-	-	-	2	-	5	-	4

Table A.2-62. 10 Days-(Winter GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	-	-	2	-	2	-	-
147	Point Lay Haulout	-	-	-	-	1	-	-	-	-	6	-	-
149	National Petroleum Reserve Alaska	-	-	-	-	-	1	-	-	-	1	-	6
150	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	-	-	-	-	1	-	1
151	Kuk River	-	-	-	-	-	1	-	-	-	1	-	3
174	Russia Chukchi Coast Marine Mammals	1	1	-	-	1	-	1	1	-	1	-	-
175	Russia Chukchi Coast	2	2	1	-	2	-	2	3	1	1	-	-
176	United States Chukchi Coast	-	-	1	-	3	4	-	5	1	14	1	12
177	United States Beaufort Coast	-	-	-	-	-	1	-	-	-	-	1	2

Table A.2-63. 30 Days-(Winter GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	1	-	-	-	-	-	-	-	-	-	-	-
135	Kolyuchin Bay	-	-	-	-	1	-	-	1	-	-	-	-
138	Chukota Coast Haulout	-	1	-	-	2	1	-	2	1	2	1	1
143	WAH Insect Relief	-	-	-	-	1	-	-	1	-	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	1	-	2	-	3	-	-
146	Ledyard Bay	-	-	-	-	-	-	-	1	-	1	-	-
147	Point Lay Haulout	-	-	-	-	1	1	-	1	-	7	-	1
148	Kasegaluk Brown Bears	-	-	-	-	-	-	-	-	-	1	-	-
149	National Petroleum Reserve Alaska	-	1	1	1	1	3	1	-	1	2	2	9
150	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	1	-	-	-	1	-	2
151	Kuk River	-	-	-	-	1	2	-	1	1	2	1	4
174	Russia Chukchi Coast Marine Mammals	5	6	5	5	6	5	6	7	5	5	5	4
175	Russia Chukchi Coast	17	27	19	13	26	17	25	30	19	19	13	13
176	United States Chukchi Coast	1	2	3	3	7	10	2	8	4	22	4	18
177	United States Beaufort Coast	-	-	-	1	1	2	-	-	1	1	2	4

Table A.2-64. 60 Days-(Winter GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	1	1	1	-	-	-	1	-	-	-	-	-
135	Kolyuchin Bay	-	-	-	-	1	-	-	1	-	-	-	-
138	Chukota Coast Haulout	1	2	1	1	3	2	1	3	2	3	1	2
143	WAH Insect Relief	-	-	-	-	1	1	-	1	1	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	1	-	2	-	3	-	-
146	Ledyard Bay	-	-	-	-	1	-	-	1	-	1	-	-
147	Point Lay Haulout	-	-	-	-	1	1	-	1	-	7	1	1
148	Kasegaluk Brown Bears	-	-	-	-	-	1	-	-	-	1	-	-
149	National Petroleum Reserve Alaska	1	1	1	2	1	3	1	1	2	3	3	9
150	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	1	-	-	-	1	-	2
151	Kuk River	-	-	1	-	1	2	-	1	1	2	1	4
174	Russia Chukchi Coast Marine Mammals	10	12	11	9	11	9	11	11	10	9	8	7
175	Russia Chukchi Coast	31	49	39	30	46	35	47	48	39	36	29	27
176	United States Chukchi Coast	2	3	4	4	9	11	3	9	6	23	6	20
177	United States Beaufort Coast	-	-	1	2	1	2	-	1	1	1	3	4

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-65. 180 Days-(Winter GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	2	3	2	2	3	2	3	3	3	2	2	2
135	Kolyuchin Bay	-	-	-	-	1	-	-	1	-	-	-	-
138	Chukota Coast Haulout	1	2	2	1	3	3	2	3	2	3	2	2
143	WAH Insect Relief	-	-	-	-	1	1	-	1	1	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	1	-	2	-	3	-	-
146	Ledyard Bay	-	-	-	-	1	-	-	1	-	1	-	-
147	Point Lay Haulout	-	-	-	-	1	1	-	1	-	7	1	1
148	Kasegaluk Brown Bears	-	-	1	1	-	1	-	-	1	1	1	-
149	National Petroleum Reserve Alaska	1	1	2	2	2	4	1	1	2	3	3	10
150	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	1	-	-	-	1	1	2
151	Kuk River	-	-	1	1	1	2	-	1	1	2	1	4
152	TCH Insect Relief/Calving	-	-	-	-	1	-	-	1	-	1	-	1
174	Russia Chukchi Coast Marine Mammals	14	17	16	14	15	14	16	15	15	13	13	12
175	Russia Chukchi Coast	40	58	50	40	54	45	56	56	50	43	39	36
176	United States Chukchi Coast	2	3	5	5	10	12	3	10	6	23	7	20
177	United States Beaufort Coast	1	1	1	2	2	3	1	1	2	2	3	5

Table A.2-66. 360 Days-(Winter GLS).

ID	Grouped Land Segments Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
133	Mys Blossom	2	3	3	2	3	2	3	3	3	2	2	2
135	Kolyuchin Bay	-	-	-	-	1	-	-	1	-	-	-	-
138	Chukota Coast Haulout	1	2	2	1	3	3	2	3	2	3	2	2
143	WAH Insect Relief	-	-	-	-	1	1	-	1	1	1	-	-
144	Alaska Maritime Wildlife Refuge	-	-	-	-	1	1	-	2	-	3	-	-
146	Ledyard Bay	-	-	-	-	1	-	-	1	-	1	-	-
147	Point Lay Haulout	-	-	-	-	1	1	-	1	-	7	1	1
148	Kasegaluk Brown Bears	-	-	1	1	-	1	-	-	1	1	1	-
149	National Petroleum Reserve Alaska	1	1	2	2	2	4	1	1	2	3	3	10
150	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	1	-	-	-	1	1	2
151	Kuk River	-	-	1	1	1	2	-	1	1	2	1	4
152	TCH Insect Relief/Calving	-	-	-	-	1	-	-	1	-	1	-	1
174	Russia Chukchi Coast Marine Mammals	14	17	16	14	15	14	16	15	16	13	13	12
175	Russia Chukchi Coast	40	58	50	40	54	45	57	56	50	43	39	36
176	United States Chukchi Coast	2	3	5	5	10	12	3	10	6	23	7	20
177	United States Beaufort Coast	1	1	1	2	2	3	1	1	2	2	3	5

Tables A.2-67 through A.2-72 represent winter conditional probabilities (expressed as percent chance) that a large oil spill starting at a particular location will contact a certain boundary segment within:

Table A.2-67. 3 Days-(Winter BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9

Note: All rows have all values less than 0.5 percent and are not shown.

Table A.2-68. 10 Days-(Winter BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9

Note: All rows have all values less than 0.5 percent and are not shown.

Table A.2-69. 30 Days-(Winter BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Bering Strait	-	-	-	-	-	-	-	1	-	-	-	-
2	Bering Strait	-	-	-	-	1	-	-	1	-	-	-	-
3	Chukchi Sea	1	1	-	-	-	-	1	-	-	-	-	-
4	Chukchi Sea	2	-	1	-	-	-	1	-	-	-	-	-
5	Chukchi Sea	2	-	-	1	-	-	-	-	-	-	-	-
6	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
7	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
11	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
12	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
19	Chukchi Sea	-	-	-	1	-	-	-	-	-	-	-	-

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-70. 60 Days-(Winter BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Bering Strait	-	-	-	-	1	-	-	1	-	-	-	-
2	Bering Strait	-	-	-	-	1	1	-	2	-	1	-	-
3	Chukchi Sea	1	1	1	1	-	1	1	-	1	-	1	-
4	Chukchi Sea	3	1	1	2	-	-	1	-	1	-	2	-
5	Chukchi Sea	4	1	1	2	-	-	1	-	1	-	1	-
6	Chukchi Sea	4	1	1	2	-	-	2	-	1	-	1	-
7	Chukchi Sea	3	1	2	2	-	-	2	-	1	-	1	-
8	Chukchi Sea	2	1	1	1	-	-	1	-	1	-	1	-
9	Chukchi Sea	2	1	1	1	-	-	1	-	1	-	1	-
10	Chukchi Sea	2	-	1	1	-	-	-	-	1	-	1	-
11	Chukchi Sea	2	-	1	1	-	-	-	-	1	-	1	-
12	Chukchi Sea	2	-	-	1	-	-	-	-	-	-	1	-
13	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
14	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-
15	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
16	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	-	-
17	Chukchi Sea	1	-	1	1	-	-	1	-	-	-	1	-
18	Chukchi Sea	1	-	1	2	-	1	-	-	1	-	1	1
19	Chukchi Sea	1	-	1	2	-	1	-	-	1	-	1	1
20	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	1

Table A.2-71. 180 Days-(Winter BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Bering Strait	-	-	-	-	1	-	-	1	-	1	-	-
2	Bering Strait	-	-	-	-	1	1	-	2	-	1	-	-
3	Chukchi Sea	2	1	1	1	-	1	2	-	1	-	1	1
4	Chukchi Sea	4	2	2	2	1	1	2	1	1	1	3	1
5	Chukchi Sea	6	2	2	3	1	1	3	2	2	1	3	1
6	Chukchi Sea	6	3	4	4	2	2	4	2	3	1	3	2
7	Chukchi Sea	5	3	4	4	2	3	3	2	3	2	4	3
8	Chukchi Sea	3	2	2	3	1	1	2	1	2	1	2	1
9	Chukchi Sea	3	1	2	2	1	1	1	1	1	-	1	1
10	Chukchi Sea	3	1	2	3	1	1	1	1	2	1	2	1
11	Chukchi Sea	3	2	2	3	1	1	2	1	2	1	2	1
12	Chukchi Sea	3	1	2	2	1	1	1	1	2	1	2	1
13	Chukchi Sea	2	1	2	2	1	1	1	1	1	1	1	1
14	Chukchi Sea	2	1	2	2	1	1	1	1	1	1	2	1
15	Chukchi Sea	2	1	1	2	1	1	1	1	1	1	2	1
16	Chukchi Sea	2	1	1	2	1	1	1	1	1	1	1	1
17	Chukchi Sea	2	2	2	3	2	2	2	2	2	1	3	2
18	Chukchi Sea	2	2	3	4	4	4	2	3	4	3	4	3
19	Chukchi Sea	3	2	2	3	2	3	2	1	2	2	3	3
20	Chukchi Sea	1	1	2	2	1	1	1	1	2	1	1	1
21	Chukchi Sea	1	-	1	1	-	1	1	-	1	-	1	1
22	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
23	Beaufort Sea	-	-	-	1	-	1	-	-	-	-	1	-
24	Beaufort Sea	-	-	-	1	-	-	-	-	-	-	1	1
25	Beaufort Sea	-	-	-	-	-	-	-	-	-	-	1	1
38	Beaufort Sea	-	1	1	1	1	1	1	1	1	1	-	-

Table A.2-72. 360 Days-(Winter BS).

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
1	Bering Strait	-	-	-	-	1	-	-	1	-	1	-	-
2	Bering Strait	-	-	-	-	1	1	-	2	-	1	-	-
3	Chukchi Sea	2	1	1	1	-	1	2	-	1	-	1	1
4	Chukchi Sea	4	2	2	2	1	1	2	1	1	1	3	1
5	Chukchi Sea	6	2	2	3	1	1	3	2	2	1	3	1
6	Chukchi Sea	6	4	4	5	2	2	4	2	3	1	3	2
7	Chukchi Sea	5	3	4	4	2	3	3	2	4	2	4	3
8	Chukchi Sea	3	2	2	3	1	1	2	1	2	1	2	1
9	Chukchi Sea	3	1	2	2	1	1	1	1	1	-	2	1
10	Chukchi Sea	3	1	2	3	1	1	1	1	2	1	2	1
11	Chukchi Sea	3	2	2	3	1	2	2	1	2	1	2	1
12	Chukchi Sea	3	1	2	2	1	1	1	1	2	1	2	1
13	Chukchi Sea	2	1	2	2	1	1	1	1	1	1	1	1
14	Chukchi Sea	2	1	2	2	1	1	1	1	2	1	2	1

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ID	Boundary Segment Name	LA 1	LA 4	LA 5	LA 6	LA 10	LA 11	PL 2	PL 3	PL 5	PL 6	PL 8	PL 9
15	Chukchi Sea	2	1	1	2	1	1	1	1	1	1	2	1
16	Chukchi Sea	2	1	1	2	1	1	1	1	1	1	1	1
17	Chukchi Sea	2	2	2	3	2	2	2	2	2	2	3	3
18	Chukchi Sea	2	2	3	4	4	4	2	3	4	3	4	3
19	Chukchi Sea	3	2	2	3	2	3	3	1	2	2	3	3
20	Chukchi Sea	1	1	2	2	1	1	1	1	2	1	2	1
21	Chukchi Sea	1	-	1	1	1	1	1	-	1	-	1	1
22	Chukchi Sea	1	-	-	1	-	-	-	-	-	-	1	-
23	Beaufort Sea	-	-	-	1	-	1	-	-	-	-	1	-
24	Beaufort Sea	-	-	-	1	-	1	1	-	-	-	1	1
25	Beaufort Sea	-	-	-	1	-	1	-	-	-	-	1	1
38	Beaufort Sea	-	1	1	1	1	1	1	1	1	1	-	-

Tables A.2-73 through A.2-75 represent combined probabilities (expressed as percent chance), over the assumed life of the Leased Area, Alternatives I, III or IV, of one or more spills ≥1,000 Bbl, and the estimated number of spills (mean), occurring and contacting a certain:

Table A.2-73. Environmental Resource Area.

ERA ID	Environmental Resource Area Name	3 days		10 days		30 days		60 days		180 days		360 days	
		%	mean	%	mean	%	mean	%	mean	%	mean	%	mean
0	Land	3	0.04	13	0.14	37	0.45	47	0.64	51	0.72	52	0.73
1	Kasegaluk Lagoon Area	2	0.02	3	0.03	4	0.05	5	0.05	5	0.05	5	0.05
2	Point Barrow, Plover Islands	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
3	SUA: Uelen/Russia	-	-	-	-	1	0.01	1	0.01	2	0.02	2	0.02
4	SUA:Naukan/Russia	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
6	Hanna Shoal	2	0.02	5	0.05	9	0.10	11	0.12	13	0.14	13	0.14
7	Krill Trap	0	0	1	0.01	3	0.03	3	0.03	3	0.03	3	0.03
10	Ledyard Bay SPEI Crit.Hab. Area	11	0.11	13	0.14	14	0.15	15	0.16	15	0.16	15	0.16
11	Wrangel Island 12 nmi & Offshore	-	-	-	-	3	0.03	4	0.04	6	0.06	6	0.06
15	Cape Lisburne Seabird Col. Area	1	0.01	3	0.03	4	0.05	5	0.05	5	0.05	5	0.05
16	Barrow Canyon	1	0.01	5	0.05	10	0.10	11	0.12	12	0.13	12	0.13
18	Murre Rearing and Molting Area	-	-	3	0.03	8	0.08	9	0.09	10	0.11	10	0.11
19	Chukchi Spring Lead System	6	0.07	9	0.09	11	0.11	11	0.12	12	0.12	12	0.12
20	East Chukchi Offshore	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
23	Polar Bear Offshore	21	0.24	27	0.31	30	0.36	31	0.37	31	0.37	31	0.37
30	Beaufort Spring Lead 1	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
31	Beaufort Spring Lead 2	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
38	SUA: Pt. Hope - Cape Lisburne	0	0	2	0.02	3	0.03	4	0.04	4	0.04	4	0.04
39	SUA: Pt. Lay - Kasegaluk	8	0.08	10	0.11	12	0.13	13	0.13	13	0.13	13	0.13
40	SUA: Icy Cape - Wainwright	9	0.09	18	0.20	24	0.27	25	0.29	26	0.30	26	0.30
41	SUA: Barrow - Chukchi	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
42	SUA: Barrow - East Arch	-	-	1	0.01	3	0.03	3	0.03	4	0.04	4	0.04
43	SUA: Nuiqsut - Cross Island	-	-	-	-	1	0.01	1	0.01	2	0.02	2	0.02
46	Wrangel Island 12 nmi Buffer 2	-	-	-	-	2	0.02	5	0.05	6	0.06	6	0.06
47	Hanna Shoal Walrus Use Area	9	0.09	14	0.16	21	0.23	23	0.26	25	0.29	25	0.29
48	Chukchi Lead System 4	13	0.14	17	0.19	20	0.23	21	0.24	22	0.24	22	0.25
49	Chukchi Spring Lead 1	0	0	1	0.01	2	0.03	3	0.03	3	0.03	3	0.03
50	Pt Lay Walrus Offshore	11	0.11	14	0.15	16	0.17	16	0.18	17	0.18	17	0.18
51	Pt Lay Walrus Nearshore	6	0.06	7	0.08	8	0.09	8	0.09	8	0.09	8	0.09
52	Russian Coast Walrus Offshore	-	-	3	0.03	10	0.10	11	0.11	12	0.12	12	0.12
53	Chukchi Spring Lead 2	9	0.09	10	0.11	11	0.12	12	0.13	12	0.13	12	0.13
54	Chukchi Spring Lead 3	2	0.02	5	0.05	8	0.08	9	0.09	9	0.09	9	0.09
55	Point Barrow, Plover Islands	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
56	Hanna Shoal Area	3	0.03	5	0.05	7	0.08	8	0.09	10	0.11	10	0.11
57	Skull Cliffs	1	0.01	3	0.03	6	0.06	6	0.06	7	0.07	7	0.07
58	Russian Coast Walrus Nearshore	-	-	1	0.01	3	0.03	4	0.04	4	0.04	4	0.04
59	Ostrov Kolyuchin	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
61	Pt Lay-Barrow BH GW SFF	9	0.10	16	0.17	21	0.23	22	0.25	23	0.26	23	0.26
62	Herald Shoal Polynya 2	-	-	3	0.03	7	0.07	9	0.09	9	0.10	9	0.10
63	North Chukchi	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
64	Peard Bay Area	1	0.01	4	0.05	8	0.09	9	0.09	9	0.10	9	0.10

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

ERA ID	Environmental Resource Area Name	3 days		10 days		30 days		60 days		180 days		360 days	
		%	mean	%	mean	%	mean	%	mean	%	mean	%	mean
66	Herald Island	-	-	-	-	1	0.01	1	0.01	2	0.02	2	0.02
70	North Central Chukchi	-	-	-	-	1	0.01	1	0.01	1	0.02	2	0.02
74	Offshore Herald Island	-	-	1	0.01	3	0.03	3	0.03	3	0.03	3	0.03
80	Beaufort Outer Shelf 1	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
82	N Chukotka Nrshr 2	-	-	-	-	3	0.03	3	0.03	3	0.03	3	0.03
83	N Chukotka Nrshr 3	-	-	-	-	3	0.03	3	0.03	4	0.04	4	0.04
91	Hope Sea Valley	-	-	1	0.01	4	0.04	4	0.04	4	0.04	4	0.04
101	Beaufort Outer Shelf 2	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
102	Opilio Crab EFH	-	-	2	0.03	6	0.06	7	0.08	7	0.08	7	0.08
103	Saffron Cod EFH	15	0.16	27	0.32	37	0.46	39	0.49	40	0.51	40	0.51
107	Pt Hope Offshore	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
108	Barrow Feeding Aggregation	-	-	1	0.01	2	0.02	2	0.02	2	0.02	2	0.03
109	AK BFT Shelf Edge	-	-	-	-	-	-	-	-	1	0.01	1	0.01
110	AK BFT Outer Shelf&Slope 1	-	-	-	-	-	-	-	-	1	0.01	1	0.01
111	AK BFT Outer Shelf&Slope 2	-	-	-	-	-	-	-	-	1	0.01	1	0.01
112	AK BFT Outer Shelf&Slope 3	-	-	-	-	-	-	-	-	1	0.01	1	0.01
113	AK BFT Outer Shelf&Slope 4	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
114	AK BFT Outer Shelf&Slope 5	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
115	AK BFT Outer Shelf&Slope 6	-	-	-	-	1	0.01	1	0.01	2	0.02	2	0.02
116	AK BFT Outer Shelf&Slope 7	-	-	-	-	1	0.01	2	0.02	2	0.03	3	0.03
117	AK BFT Outer Shelf&Slope 8	-	-	-	-	2	0.02	2	0.02	3	0.03	3	0.03
118	AK BFT Outer Shelf&Slope 9	-	-	-	-	2	0.02	3	0.03	4	0.04	4	0.04
119	AK BFT Outer Shelf&Slope 10	-	-	2	0.02	5	0.05	7	0.07	8	0.08	8	0.08
120	Russia CH GW Fall 1&2	-	-	1	0.01	3	0.03	3	0.03	3	0.03	3	0.03
121	Cape Lisburne - Pt Hope	1	0.01	2	0.02	2	0.02	3	0.03	3	0.03	3	0.03
122	North Chukotka Offshore	-	-	-	-	2	0.02	2	0.02	2	0.02	2	0.02
123	AK Chukchi Offshore	2	0.02	4	0.04	6	0.06	6	0.06	6	0.06	6	0.06
124	Central Chukchi Offshore	-	-	2	0.03	5	0.05	5	0.06	5	0.06	5	0.06

Table A.2-74. Land Segment.

LS ID	Land Segment Name	3 days		10 days		30 days		60 days		180 days		360 days	
		%	mean	%	mean	%	mean	%	mean	%	mean	%	mean
5	Mys Evans	-	-	-	-	-	-	-	-	1	0.01	1	0.01
6	Ostrov Mushtakova	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
7	Kosa Bruch	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
8	E. Wrangel Island, Skeletov	-	-	-	-	1	0.01	1	0.01	2	0.02	2	0.02
9	Mys Proletarskiy	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
10	Bukhta Davidova	-	-	-	-	-	-	-	-	1	0.01	1	0.01
19	Laguna Kuepil'khin, Leningradskiy	-	-	-	-	-	-	-	-	1	0.01	1	0.01
20	Polyarnyy, Pil'gyn	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
21	Laguna Pil'khikay, Pil'khikay	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
22	Rypkarpyy, Mys Shmidta	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
23	Emuem, Tenkergin	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
24	LS 24	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
25	Laguna Amguema, Yulinu	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
26	Ekugvaam, Kepin, Pil'khin	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
27	Laguna Nut, Rigol'	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
28	Vankarem,Vankarem Laguna	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
29	Mys Onman, Vel'may	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
30	Nutepynmin, Pyngopil'gyn	-	-	-	-	2	0.02	3	0.03	3	0.03	3	0.03
31	Alyatki, Zaliv Tasytkhin	-	-	-	-	2	0.02	3	0.03	3	0.03	3	0.03
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
33	Neskan, Laguna Neskan	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
34	Tepken, Memino	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
35	Enurmino, Mys Neten	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
36	Mys Serdtse-Kamen	-	-	-	-	1	0.01	2	0.02	2	0.02	2	0.02
37	Chegitun, Utkan	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
64	Kukpuk River, Point Hope	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
65	Buckland, Cape Lisburne	-	-	1	0.01	1	0.01	2	0.02	2	0.02	2	0.02
66	Ayugatak Lagoon	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
72	Point Lay, Siksrikpak Point	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01
73	Tungaich Point, Tungak Creek	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01
74	Kasegaluk Lagoon, Solivik Isl.	-	-	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01
75	Akeonik, Icy Cape	-	-	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01
76	Avak Inlet, Tunalik River	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
77	Nivat Point, Nokotlek Point	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
78	Point Collie, Sigeakruk Point	-	-	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01
79	Point Belcher, Wainwright	-	-	1	0.01	3	0.03	3	0.03	3	0.03	3	0.03
80	Eluksingiak Point, Kugrua Bay	-	-	1	0.01	2	0.02	2	0.02	2	0.02	2	0.02
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	1	0.01	1	0.01
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	1	0.01	1	0.01	1	0.01
84	Will Rogers & Wiley Post Mem.	-	-	1	0.01	2	0.02	2	0.02	2	0.02	2	0.02
85	Barrow, Browerville, Elson Lag.	-	-	1	0.01	3	0.03	3	0.04	4	0.04	4	0.04

Table A.2-75. Grouped Land Segment.

GLS ID	Grouped Land Segment Name	3 days		10 days		30 days		60 days		180 days		360 days	
		%	mean	%	mean	%	mean	%	mean	%	mean	%	mean
133	Mys Blossom	-	-	-	-	1	0.01	2	0.02	4	0.04	4	0.04
135	Kolyuchin Bay	-	-	-	-	2	0.02	2	0.02	2	0.02	2	0.02
136	Ostrov Idlidlya	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
137	Mys Serditse Kamen	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
138	Chukotka Coast Haulout	-	-	-	-	2	0.02	2	0.02	3	0.03	3	0.03
143	WAH Insect Relief	-	-	-	-	1	0.01	1	0.01	1	0.01	1	0.01
144	Alaska Maritime National Wildlife Refuge	-	-	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01
145	Cape Lisburne	-	-	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01
146	Ledyard Brown Bears	-	-	1	0.01	1	0.01	2	0.02	2	0.02	2	0.02
147	Point Lay Haulout	2	0.02	3	0.03	4	0.04	4	0.04	4	0.04	4	0.04
148	Kasegaluk Brown Bears	1	0.01	2	0.02	3	0.03	3	0.03	3	0.04	3	0.04
149	National Petroleum Reserve Alaska	-	-	2	0.02	4	0.04	5	0.05	5	0.05	5	0.05
150	Kasegaluk Lagoon Special Use Area	-	-	1	0.01	1	0.01	1	0.01	1	0.01	1	0.01
151	Kuk River	-	-	2	0.02	3	0.04	4	0.04	4	0.04	4	0.04
152	TCH Insect Relief/Calving	-	-	1	0.01	2	0.02	2	0.02	2	0.02	2	0.02
174	Russia Chukchi Coast Marine Mammals	-	-	1	0.01	11	0.11	15	0.16	19	0.21	19	0.21
175	Russia Chukchi Coast	-	-	1	0.01	21	0.23	33	0.39	38	0.48	38	0.48
176	United States Chukchi Coast	3	0.03	10	0.11	17	0.19	18	0.20	19	0.21	19	0.21
177	United States Beaufort Coast	-	-	1	0.01	4	0.04	4	0.04	5	0.05	5	0.05

Note: For all tables in Section A.2, OSRA Conditional and Combined Probability Tables: ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, PL = Pipeline. Rows with all values less than 0.5 percent are not shown.

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APPENDIX B

Resource Assessment and Methodology

Resource Assessment for the Lease Sale 193 Scenario

Scenario Support Table

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Appendix B. Resource Assessment, Methodology, and Scenario Support Table

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B-1. Resource Assessment for the Lease Sale 193 Scenario

B-1.1. Purpose

This appendix was written to explain the methods used by BOEM to: (1) estimate the conditional amount of oil that could reasonably be produced from Lease Sale 193 and reasonably foreseeable future Chukchi Sea Planning Area lease sales; and (2) determine a plausible distribution of that production among the geologic prospects on which the oil resources potentially reside.

B-1.2. Resource Assessment

The methodology described in this appendix differs from a typical presale resource assessment. Typically, the leases to be acquired in a lease sale are not known when the exploration and development scenario for the EIS analyses is being prepared. As a result, there is a wide range of uncertainty about industry targets and interest in acquiring geologic prospects, and therefore, little basis to predict which blocks will be bid on and leased, and which of the associated geologic prospects potentially will be explored and developed. One way of addressing that uncertainty is to conduct the forecast under different assumptions regarding bidder perceptions about future oil prices. Among other things, this approach provides a range of outcomes reflecting both price uncertainty and bidder perceptions about those prices.

The methodology employed by BOEM for the Lease Sale 193 resource assessment used for this second SEIS is based on data from blocks that received bids in 2008 and that were subsequently evaluated for fair market value by BOEM regional staff. These bidding data and their underlying resource implications capture actual results from the lease sale; they are the most timely and accurate real world information set that can be used to assess the resources attributable to Lease Sale 193 leases.

BOEM uses an agency-created computer model program that uses Monte Carlo simulations (economic model runs) to determine ranges of possible lease block values and their associated production volumes for fair market value determinations. The program accounts for the risk of failing to find economic hydrocarbons and the risks of unfavorable economic conditions; it incorporates ranges of possible oil and gas prices and operating expenses. The chance of discovering economic hydrocarbons is less than 20%. Because of the geologic and economic risks, 85% of program iterations evaluated at a starting oil price of $110 resulted in zero production. BOEM evaluated the remaining 15% of potential production volumes associated with positive economic values to determine appropriate oil and gas volumes on which to base the scenario.

In a typical presale resource assessment applied to a proven area of hydrocarbon production, such as the Gulf of Mexico, BOEM usually finds a strong relationship between oil prices and forecasted production. In contrast, when focusing on resources underlying leases issued through Lease Sale 193, BOEM finds a weak link between oil production volumes and oil prices, in part because development of oil and gas resources in a frontier area such as the Alaska OCS will be so time-consuming that the price of oil when a lease is sold may be different from the oil price at the time of the initial oil sales.

This production-price relationship is further weakened for this analysis because in the economic simulation runs, higher oil prices tend to make lower-volume iterations economic. When the price of oil is high, a smaller volume of oil may be economic. When a Monte Carlo simulation is performed, the computer program selects parameters from a range of possible values and performs calculations using those values to determine, among other things, the total oil production. These calculations are repeated for one million iterations, and the results are averaged to find mean values.

For these reasons, the forecasted amount of oil production on existing Lease Sale 193 leases in an unproven area of the OCS was not anticipated to be very sensitive to changes in oil prices. And indeed, this was found to be the case in modeling the leases issued as a result of Lease Sale 193 using

three different oil prices ($76.86, $100, and $150) and subjecting them to a simulation analysis in which only the conditional results were counted, i.e., at least one field having a lease which actually produces oil. Accordingly, it would not be meaningful to generate a range of forecasted production for use in the Lease Sale 193 SEIS based on variation in oil prices, given the methodology used to calculate the resources.

B-1.3. Resource Assessment Methodology from Lease Sale 193

The identification of bids and evaluation of tracts offered in Lease Sale 193 gives a substantial amount of information not normally available prior to a lease sale. BOEM evaluated all 487 tracts receiving bids in the lease sale and identified twenty-eight specific geologic prospects underlying these tracts. Thirteen of these prospects were screened out as uneconomic, based upon their geologic and reservoir properties. BOEM then subjected the remaining fifteen prospects to extensive statistical analysis, captured the relevant outputs of this analysis, and tested their sensitivities to price variation by re-running the original analysis at two additional oil price levels ($110 to $160). Variation in oil price was confirmed to have little effect on the conditional production estimates.

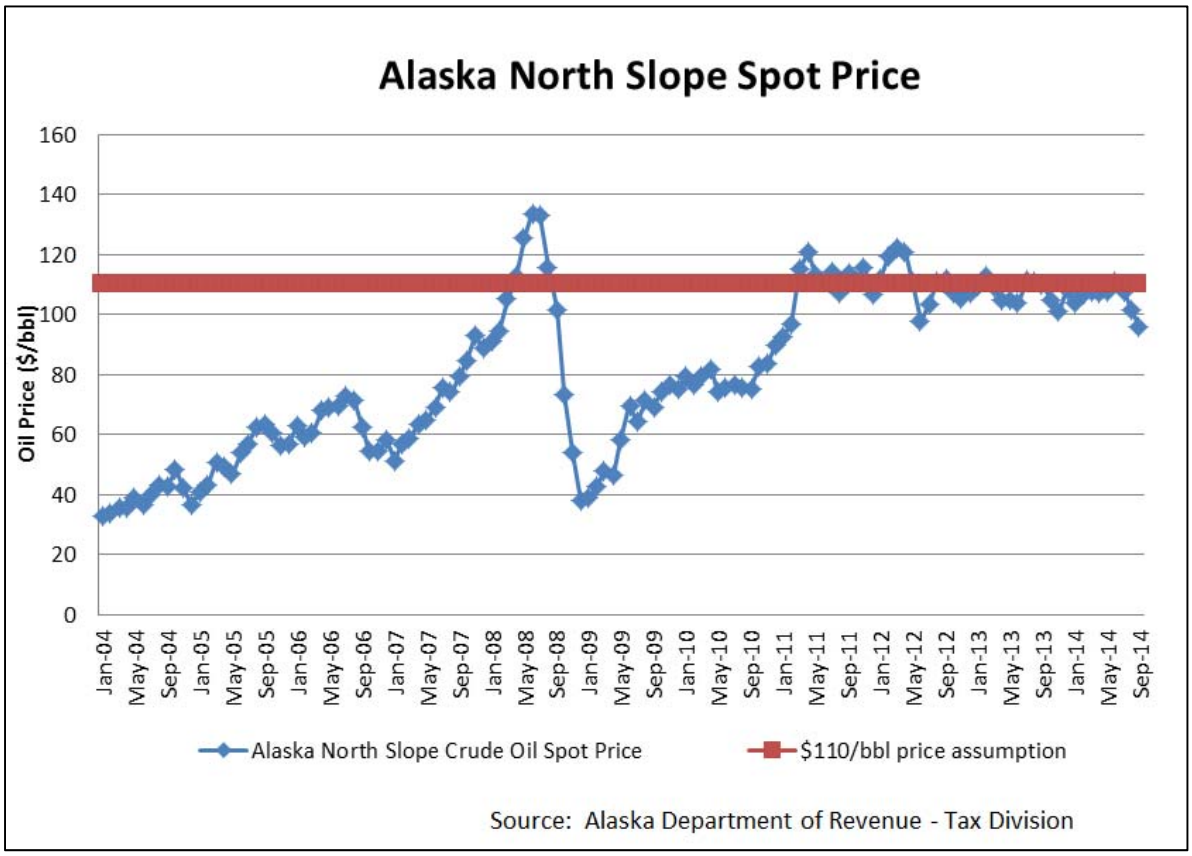

Figure B- 1. Alaska North Slope Spot Price.

The oil price of $110/bbl (in today's dollars) was selected as the most likely oil price for the analysis for two reasons. The starting oil price is adjusted for inflation during the course of the simulation run. First, $110/bbl is the most likely oil price in BOEM's Assessment of the Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2011 (BOEM Fact Sheet RED-2011-01a; November 2011). Second, $110/bbl is consistent with the current information in the U.S. Energy Information Agency's *ShortTerm Energy Outlook – July 2014,* the publication used by BOEM's Economics Division to set oil prices to be used in fair market value determinations following lease sales. The period of oil price stability accounts for the value being unchanged from 2011 to the present. This stability in oil prices is demonstrated by Figure B-1, which shows the North

Slope Crude Spot Prices from January 2004 until September 2014. The red line indicates the $110/barrel price line. While as of November 2014, crude oil prices were in a decline, the short duration of the current decline does not undermine the analysis described here, which was completed using comprehensive information available in the summer of 2014.

B-1.4. Lease Sale 193 Exploration Scenarios

Six different sequential drilling scenarios involving various degrees of assumed geologic dependence between the fifteen prospects were postulated. Based on their geologic and economic potential, the fifteen prospects were sorted into one of two categories, termed anchors and satellites (non-anchors). (A prospect becomes a field upon discovery of commercial hydrocarbons). An anchor is judged by BOEM to be capable of being developed under the given set of price assumptions, regardless of whether any other prospect is drilled successfully, and capable of supporting offshore infrastructure that may or may not currently exist. A satellite is judged by BOEM not to be independently profitable under the given set of price assumptions, but it may become profitable if an anchor is successfully drilled and its infrastructure can be shared by the satellite. The estimates of these prospects' geologic and economic characteristics derive originally from geologic play evaluations conducted for the BOEM 2011 Resource Assessment of the Undiscovered Economically Recoverable Resources and were later refined by BOEM regional staff evaluations conducted following Lease Sale 193.

Two of the fifteen prospects were judged by BOEM to be potential anchor fields. The remaining thirteen prospects were categorized as potential satellite fields, dependent on one or both of the anchors based on their geologic and geographic characteristics.

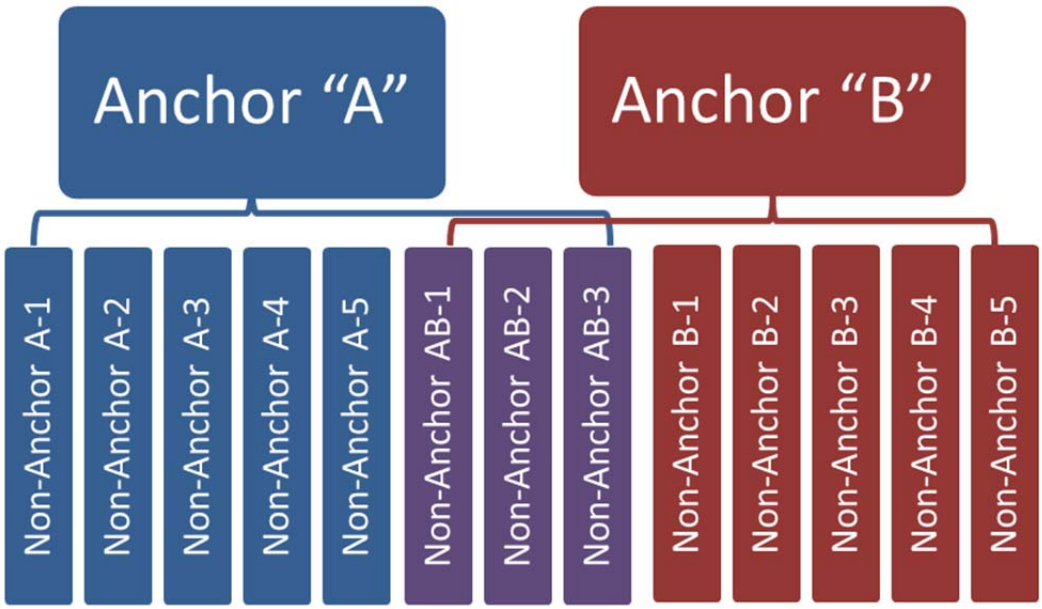

Figure B- 2. Chukchi Anchor and Non-Anchor (Satellite) Prospects. Satellite AB is dependent on either Anchor "A" or Anchor "B"

As Figure B-2 above shows, there are two prospective anchor fields, and thirteen possible satellite fields. Five of the satellites are dependent on Anchor "A," five other satellites are dependent on Anchor "B," and the remaining three satellites are dependent on either Anchor "A" or Anchor "B." These prospects and their geologic dependencies were modeled according to the following six cases. In all cases, BOEM assumes that both anchors are drilled, and that none of the satellites is drilled if drilling on both anchors is unsuccessful.

Case #1: Regardless of the success or failure of drilling the anchors, none of the satellites is tested. This case was rejected because successful production of an anchor has historically encouraged exploration of additional prospects which might take advantage of existing infrastructure.

Case #2: If one or both anchors are drilled successfully, all satellites are drilled subject to their original probability of drilling success. This case was rejected because if a satellite is geologically similar to a successful anchor, its chance of success would likely be revised upward following success at the anchor.

Case #3: If one or both anchors are drilled successfully, all satellites are drilled. The geologically dependent satellites associated with an anchor field drilled successfully are also drilled successfully (i.e., revised probability of drilling success is 100%), and, all other satellites associated with an unsuccessful anchor are drilled at their original probability of drilling success. This case was rejected because a successful anchor cannot guarantee a successful satellite, even though they are geologically related. Even though the successful anchor and the satellite are in the same rock formation, the satellite may not have a trapping mechanism to keep the oil contained. Also, it is unlikely that a satellite which is geologically related to an unsuccessful anchor would even be drilled.

Case #4: If one or both anchor fields are drilled successfully, all geologically dependent satellites associated with a successful anchor are also drilled successfully (i.e., revised probability of success is 100%), and all other satellites associated with an anchor not drilled successfully are not drilled (i.e., effective probability of drilling success is 0%). This case was rejected because it incorporates the same flawed logic with respect to geologically dependent satellites as Case #3.

Case #5: If one or both anchors are drilled successfully, all satellites are drilled. The chance of successful drilling on all geologically dependent satellites associated with a successful anchor is revised to reflect successful drilling on the related anchor field. The revised chance of success is assumed equal to the midpoint of the satellite's original probability of success and 100%. All other satellites associated with an unsuccessful anchor are drilled subject to their original probability of success. This case was rejected because it unreasonably assumes that all geologically-related satellites associated with a failed anchor would still get drilled.

Case #6: If one or both anchors are drilled successfully, all geologically dependent satellites associated with a successful anchor are drilled at a revised chance of success equal to the midpoint of the satellite's original probability of success and 100%. All other satellites are not drilled (i.e., effective probability of drilling success is 0%). This case represents the most reasonable progression of activities in light of the circumstances influencing development on the Chukchi Sea OCS.

Each of the six drilling scenarios was evaluated through a Monte Carlo simulation based on the underlying resource and economic characteristics of each geologic prospect. In order to ensure that the scenario resulted in some level of oil production to analyze in the SEIS, only those simulations in which drilling resulted in oil being discovered in commercial quantities on at least one field were considered successful trials. *Only these successful trials were included in the calculation of the conditional cumulative resource results*. Selected points on the probability curve of conditional cumulative resources for each of the cases are shown in Table B-1; the resource results are calculated at a starting oil price of $110 per barrel.

Table B-1. Conditional Cumulative Resource Results for All Cases at $110 Starting Price of Oil.

$110 Price Level	Oil Production (Bbbl)					
	Average	Minimum	5th Percentile	Median	95th Percentile	Maximum
Case #1	2.6	1.8	1.8	2.9	2.9	4.7
Case #2	3.1	1.8	1.8	2.9	5.1	7.7
Case #3	8.7	6.1	6.1	9.6	11.4	15.3
Case #4	8.5	6.1	6.1	9.6	9.7	15.3

$110 Price Level	Oil Production (Bbbl)					
	Average	Minimum	5th Percentile	Median	95th Percentile	Maximum
Case #5	5.9	1.9	2.9	5.7	9.4	13.7
Case #6	5.7	1.9	2.8	5.5	9.2	13.6

Out of the six cases, Case #6 was selected as the most plausible set of relationships and activities for depicting the drilling scenario for leases sold in Sale 193.

B-1.5. Monte Carlo Simulation Results

The table of results below for Case #6 shows the results of approximately one million successful trials in the simulation for each price case. A successful model run involves a drilling scenario in which at least one anchor field is drilled successfully and encounters an amount of oil large enough to be produced profitably. Simulation trials in which anchors are drilled, but fail to encounter economically recoverable amounts of hydrocarbons, were counted as failures. A majority of simulation trials were categorized as failures; only between 13% and 17% of model runs are successes, depending on the assumed starting oil price. To generate approximately one million successful model runs, about seven million model runs were run at each price level.

As shown in Table B-2 below, the median cumulative resource volume of the successful iterations at the $110 price case is 5.5 Bbbl of oil; the average cumulative resource volume of the successful iterations is 5.7 Bbbl of oil. While the median represents the 50th percentile of the successful iterations, in reality this figure represents about the 93rd percentile of *all* iterations.

Table B-2. Case #6-Monte Carlo Model Runs Results.

Starting Oil Price Case	Oil Resources (Bbbl)					
	Average	Minimum	5th Percentile	Median	95th Percentile	Maximum
$76.86	6.2	2.0	3.0	6.0	10.1	14.9
$110.00	5.7	1.9	2.8	5.5	9.2	13.6
$160.00	5.5	1.9	2.7	5.3	8.9	13.3
Starting Oil Price Case	**Gas Resources (TCF)**					
	Average	**Minimum**	**5th Percentile**	**Median**	**95th Percentile**	**Maximum**
$76.86	15.9	1.4	3.9	17.8	26.0	30.3
$110.00	15.8	1.4	3.9	17.6	25.5	30.0
$160.00	15.4	1.4	3.9	17.2	24.5	29.3

Next, Table B-3 shows the percent of successful iterations for each price case.

Table B-3. Successful Iterations per Price Case

Starting Oil Price Case	Successful Trials
$76.86	13%
$110.00	15%
$160.00	17%

Table B-4 shows the cumulative distribution of conditional resources from the Monte Carlo Runs at the $110 price case.

Table B-4. Case #6 Distribution of Oil, $110 Starting Price.

Percentile	Oil (Bbbl)
0.00	1.9
0.05	2.8

Percentile	Oil (Bbbl)
0.10	3.2
0.15	3.5
0.20	3.9
0.25	4.2
0.30	4.5
0.35	4.8
0.40	5.0
0.45	5.2
0.50	5.5
0.55	5.7
0.60	6.0
0.65	6.3
0.70	6.7
0.75	7.1
0.80	7.4
0.85	7.9
0.90	8.3
0.95	9.2
1.00	13.6

B-1.6. Representative Case

The BOEM Economics Division tested an assortment of combinations of anchors and satellites for statistical outcomes for aggregate resources. BOEM selected from the distribution of Case #6 results a point which (1) represents a Chukchi Sea OCS resource volume that is high enough to ensure that cumulative environmental impacts would not be underestimated; and (2) corresponds to the total of mean resource estimates associated with a combination of modeled prospects that could be linked via a realistic development scenario. *Anchor A*, with 2.9 billion barrels (Bbbl) in potential resources, was selected as the most likely candidate for an oil field of sufficient size to justify commercial development because it is the most promising and physically largest oil prospect in the Chukchi Sea. The sizable *Satellite A-2* (1.4 Bbbl) is located 30 statute miles from the center of *Anchor A*, shares some of the geological attractions of Anchor A, and would likely be drilled first in the event of a significant discovery at *Anchor A* because it offers a greater geological chance of success (10%) than other more remote and sizeable satellites (6%-8%).

As shown in Table B-5, BOEM's above analysis resulted in oil resources for the Lease Sale 193 Scenario of 4.3 Bbbl. This represents a substantial reserve base; the largest known oil field in the entire GOMR (Mars-Ursa) has estimated reserves of 1.3 Bbbl.

Table B- 5. Resource Assessment for Sale 193 Leases.

Hypothetical Oil Pool	Recoverable Oil (Billions of Barrels)	Recoverable Solution Gas (Trillions of Cubic Feet)
Anchor A	2.9	1.224
Satellite A-2	1.4	1.113
Aggregate	4.3	2.337

The time required for *Anchor A* to be explored, delineated, and developed will be impacted by the short Arctic open-water seasons, the absence of existing infrastructure, and limited availability of suitable equipment and materials. The massive capital and personnel requirements to develop projects of this size and complexity will require even major operators to focus solely on one field at a time.

Operators would be reluctant to commit additional resources to exploring, delineating and developing satellites (i.e. smaller prospects) until an anchor is proven. Available capital, drilling equipment inventories, and personnel will inevitably be largely committed to the massive effort to develop *Anchor A*, once proven. It is anticipated that concurrently exploring, delineating and developing *Satellite A-2* – if in fact feasible – would require the use of any remaining drilling equipment inventories.

Leases were issued for ten year terms and cannot be extended without a demonstration of diligence on the part of the operator. Were development of *Anchor A* and *Satellite A-2* to proceed, it is unreasonable to assume that sufficient capital, equipment, personnel and other resources would exist to also enable the exploration, delineation and diligent development of any additional fields prior to the expiration of leases issued as a result of Lease Sale 193. It is also unreasonable to presume that Satellites *A-1* and *A-3* would be unitized with *Anchor A* and/or *Satellite A-2*. Even in the case where an exploration well (or two) discovers hydrocarbons in both satellites *A-1 and A-3*, it is unlikely that the well results would be sufficient to justify BSEE approval for incorporation of all of the associated leases into a unit. It is more likely that lease terms would expire on undeveloped satellite prospects, with those blocks being reoffered in subsequent lease sales.

Satellites *A-1* and *A-3* are therefore identified as potential candidates for development via future Chukchi Sea OCS lease sales. Table 6 below summarizes a scenario for future lease sales. The potential oil reserves assumed to be produced from reasonably foreseeable future lease sales represent an additional 1.9 Bbbl, for a project total of 6.2 Bbbl. The resources associated with this scenario represent approximately the 95th percentile of all modeled results.

Table B- 6. Resource Assessment for Future Chukchi Sea OCS Lease Sales.

Hypothetical Oil Pool	Recoverable Oil (Billions of Barrels)	Recoverable Solution Gas (Trillions of Cubic Feet)
Satellite A-1	1.5	1.858
Satellite A-3	0.4	0.178
Aggregate	1.9	2.036

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Table B-7. Scenario Support Table.

Year	Marine Seismic Survey	Geohazard Survey	Geotechnical Survey	Exploration/ Delineation Wells	Offshore Exploration Platform		Offshore Production Platform		On-Platform Production and Service Wells	Sub-Sea Wells	Offshore Pipelines (Export Lines)		Onshore Pipelines		Exploration Base	Production Base	Supply Boat Terminal	Air Support Base	Search & Rescue Base	Gas Production (BCF)			Oil and Condensate Production (MMBbl)		
											Oil	Gas	Oil	Gas						Anchor A	A-2	TOTAL	Anchor A	A-2	TOTAL
				# of wells	*#*	*Type*	*#*	*Type*	*# of wells*	*# of wells*	*mi*	*mi*	*mi*	*mi*						*BCF/yr*			*MMbbl*		
1	1	1	1	-	-		-		-	-	-	-	-	-	1	-	-	1	1	-		-	-		-
2	-	1	1	-	-		-		-	-	-	-	-	-		-	-			-		-	-		-
3	-	-	-	4	2	Rig	-		-	-	-	-	-	-	-	-	-	-	-	-		-	-		-
4	-	-	-	4	2	Rig	-		-	-	-	-	-	-	-	-	-	-	-	-		-	-		-
5	-	1	1	4	2	Rig	-		-	-	-	-	-	-	-	1	1	-	-	-		-	-		-
6	-	1	1	4	2	Rig	-		-	-	40	-	75	-	-			-	-	-		-	-		-
7	-	1	1	4	2	Rig	-		-	-	40	-	75	-	-	-	-	-	-	-		-	-		-
8	1	-	-	4	2	Rig	-		-	-	40	-	75	-	-	-	-	-	-	-		-	-		-
9	-		-	4	2	Rig	-		-	-	40	-	75	-	-	-	-	-	-	-		-	-		-
10	-	-	-	-	-		1	GBS	3	-	-	-	-	-	-	-	-	-	-	-		-	1		**1.475**
11	1	1	1	-	-		-		16	-	-	-	-	-	-	-	-	-	-	-		-	21		**20.646**
12	-	-	-	-	2	Rig	-		16	6	-	-	-	-	-	-	-	-	-	-		-	47		**47.060**
13	-	-	-	-	2	Rig	1	GBS	19	6	5	-	-	-	-	-	-	-	-	-		-	75		**74.560**
14	-	1	1	-	2	Rig	-		25	6	-	-	-	-	-	-	-	-	-	-		-	106		**106.482**
15	1	-	-	-	3	Rig	-		16	9	-	-	-	-	-	-	-	-	-	-		-	125		**124.856**
16	-	-	-	-	3	Rig	1	GBS	19	9	5	-	-	-	-	-	-	-	-	-		-	143		**142.809**
17	-	1	1	-	3	Rig	-		25	9	-	-	-	-	-	-	-	-	-	-		-	165		**165.459**
18	-	-	-	-	3	Rig	-		16	9	-	-	-	-	-	-	-	-	-	-		-	174		**173.831**
19	1	1	1	-	3	**Rig**	1	**GBS**	19	9	5	-	-	-	-	-	-	-	-	-	-	-	182	-	**181.871**
20	-	2	2	4	4	**Rig**	-		25	6	-	-	-	-	-	-	-	-	-	-	-	-	193	-	**193.134**
21	1	-	-	4	4	**Rig**	-		16	6	-	-	-	-	-	-	-	-	-	-	-	-	190	-	**190.310**
22	-	-	-	4	4	**Rig**	1	**GBS**	19	6	5	-	-	-	-	-	-	-	-	-	-	-	192	-	**191.860**
23	-	1	1	-	3	**Rig**	-		25	9	20	-	-	-	-	-	-	-	-	-	-	-	204	-	**204.420**
24	-	-	-	-	-		1	**GBS**	19	-	-	-	-	-	-	-	-	-	-	-	-	-	193	2	**194.160**
25	1	-	-	-	-		-		32	-	-	-	-	-	-	-	-	-	-	-	-	-	181	23	**203.926**
26	-	-	-	-	-		-		19	-	-	-	-	-	-	-	-	-	-	-	-	-	151	45	**195.478**
27	-	-	-	-	-		1	GBS	19	-	5	40	-	75	-	-	-	-	-	-	-	-	121	69	**189.812**
28	-	1	1	-	-		-		21	-	-	40	-	75	-	-	-	-	-	-	-	-	95	92	**186.852**
29	1	-	-	-	-		-		16	-	-	40	-	75	-	-	-	-	-	-	-	-	74	105	**178.893**
30	-	-	-	-	-		1	**GBS**	19	-	5	40	-	75	-	-	-	-	-	-	-	-	57	118	**174.988**
31	-	-	-	-	-		-		21	-	-	-	-	-	-	-	-	-	-	1	-	**0.605**	45	130	**175.106**
32	-	-	-	-	-		-		16	-	-	-	-	-	-	-	-	-	-	8	-	**8.465**	35	135	**169.592**
33	-	-	-	-	-		-		16	-	-	-	-	-	-	-	-	-	-	19	-	**19.295**	27	137	**164.220**
34	-	-	-	-	-		-		2	-	-	5	-	-	-	-	-	-	-	31	-	**30.569**	21	115	**135.932**
35	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	44	-	**43.658**	16	93	**108.688**
36	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	51	-	**51.191**	12	72	**84.452**
37	-	-	-	-	-		-		-	-	-	5	-	-	-	-	-	-	-	59	-	**58.552**	9	56	**65.503**
38	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	68	-	**67.838**	7	44	**50.676**
39	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	71	-	**71.271**	5	34	**39.222**
40	-	-	-	-	-		-		-	-	-	5	-	-	-	-	-	-	-	75	-	**74.567**	4	27	**30.278**
41	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	79	-	**79.185**	3	21	**23.266**
42	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	78	-	**78.027**	2	16	**17.910**
43	-	-	-	-	-		-		-	-	-	25	-	-	-	-	-	-	-	79	-	**78.663**	1	13	**13.692**

Year	Marine Seismic Survey	Geohazard Survey	Geotechnical Survey	Exploration/ Delineation Wells	Offshore Exploration Platform		Offshore Production Platform		On-Platform Production and Service Wells	Sub-Sea Wells	Offshore Pipelines (Export Lines)		Onshore Pipelines		Exploration Base	Production Base	Supply Boat Terminal	Air Support Base	Search & Rescue Base	Gas Production (BCF)			Oil and Condensate Production (MMBbl)		
											Oil	Gas	Oil	Gas						Anchor A	A-2	TOTAL	Anchor A	A-2	TOTAL
				# of wells	#	Type	#	Type	# of wells	# of wells	mi	mi	mi	mi						BCF/yr			MMbbl		
44	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	84	-	**83.812**	1	10	**10.314**
45	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	79	1	**80.152**	0	8	**7.868**
46	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	74	17	**91.267**	0	6	**5.794**
47	-	-	-	-	-		-		-	-	-	5	-	-	-	-	-	-	-	62	33	**94.865**	-	4	**4.318**
48	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	50	51	**100.557**	-	3	**3.154**
49	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	39	68	**107.054**	-	2	**2.220**
50	-	-	-	-	-		-		-	-	-	5	-	-	-	-	-	-	-	30	78	**108.068**	-	2	**1.545**
51	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	24	87	**110.556**	-	1	**0.994**
52	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	18	97	**114.835**	-	1	**0.538**
53	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	14	100	**114.066**	-	0	**0.236**
54	-	-	-	-	2	Rig	-		-	-	-	-	-	-	-	-	-	-	-	11	102	**112.689**	-	-	**-**
55	-	-	-	-	2	Rig	-		-	-	-	-	-	-	-	-	-	-	-	8	85	**93.787**	-	-	**-**
56	-	-	-	-	2	Rig	-		-	-	-	-	-	-	-	-	-	-	-	6	69	**75.231**	-	-	**-**
57	-	-	-	-	3	Rig	-		-	-	-	-	-	-	-	-	-	-	-	5	54	**58.523**	-	-	**-**
58	-	-	-	-	3	Rig	-		-	-	-	-	-	-	-	-	-	-	-	4	42	**45.468**	-	-	**-**
59	-	-	-	-	3	Rig	-		-	-	-	-	-	-	-	-	-	-	-	3	33	**35.272**	-	-	**-**
60	-	-	-	-	3	Rig	-		-	-	-	-	-	-	-	-	-	-	-	2	25	**27.370**	-	-	**-**
61	-	-	-	-	3	Rig	-		-	-	-	-	-	-	-	-	-	-	-	1	20	**21.206**	-	-	**-**
62	-	-	-	-	2	Rig	-		-	-	-	-	-	-	-	-	-	-	-	1	15	**16.386**	-	-	**-**
63	-	-	-	-	2	Rig	-		-	-	-	-	-	-	-	-	-	-	-	1	12	**12.675**	-	-	**-**
64	-	-	-	-	2	Rig	-		-	-	-	-	-	-	-	-	-	-	-	0	9	**9.766**	-	-	**-**
65	-	-	-	-	3	Rig	-		-	-	-	-	-	-	-	-	-	-	-	0	7	**7.463**	-	-	**-**
66	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	0	6	**5.740**	-	-	**-**
67	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	0	4	**4.277**	-	-	**-**
68	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	3	**3.196**	-	-	**-**
69	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	2	**2.334**	-	-	**-**
70	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	2	**1.643**	-	-	**-**
71	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	1	**1.144**	-	-	**-**
72	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	1	**0.735**	-	-	**-**
73	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	0	**0.398**	-	-	**-**
74	-	-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	0	**0.174**	-	-	**-**
75-77	**Decommissioning of platforms, remaining wells, and pipelines.**																								
Annual Maximum	**1**	**2**	**2**	**4**	**4**		**1**		**32**	**9**	**40**	**40**	**75**	**75**	**1**	**1**	**1**	**1**	**1**	**84**	**102**	**114.835**	**204**	**137**	**204**
Total:	**8**	**13**	**13**	**40**	**80**		**8**		**459**	**90**	**210**	**210**	**300**	**300**	**1**	**1**	**1**	**1**	**1**	**1,179**	**1,024**	**2,203**	**2,875**	**1,384**	**4,258**

Notes: A "#" = number.
A "-" = 0
Green colored cells indicate that only Anchor A related factors occur.
Numbers shown over two years indicate that project completion requires two years.

APPENDIX C

Protected Species Mitigation Measures

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Appendix C. Protected Species Mitigation Measures

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C-1. Lease Stipulations

Lease Stipulations are binding contractual provisions that apply to all Ancillary Activities, Exploration Plans (EPs), Development and Production Plans (DPPs), and Development Operations Coordination Documents (see 30 CFR §550.202). Lease Sale Stipulations often consist of protective measures designed to decrease the likelihood of impacts to environmental resources such as species protected under the Marine Mammal Protection Act (MMPA) or Endangered Species Act (ESA). A complete list of the stipulations applicable to Lease Sale 193 leases is provided in Appendix D. A brief summary of those Lease Stipulations which may serve to reduce impacts to protected species is provided below.

Stipulation No. 1. Protection of Biological Resources. Stipulation 1 is intended to protect biological resources that are discovered during the course of operations. If previously unidentified biological populations or habitats that may require additional protection – for example, marine mammal haulout areas – are identified in the lease area, the lessee may be required to conduct biological surveys to determine the extent and composition of such biological populations or habitats. The lessee may also be required to do one of more of the following: relocate the site of operations; establish that its operations will not have a significant adverse effect upon the resource identified, or that a special biological community does not exist; operate during those periods of time that do not adversely affect the biological resources; and/or modify operations to ensure that significant biological populations or habitats deserving protection are not adversely affected.

Stipulation No. 2. Orientation Program. Stipulation 2 requires that any EP or DPP include a proposed orientation program for all personnel involved in exploration or development and production activities. The orientation program must inform these individuals of relevant environmental, social, and cultural concerns along with pertinent mitigation that protect biological and cultural resources in the Leased Area and the adjacent offshore and onshore environments. The orientation programs address the importance of not disturbing important resources, such as marine mammals, and provide guidance on how to avoid disturbance.

Stipulation No. 3. Transportation of Hydrocarbons. Stipulation 3 is intended to decrease the risk of an oil spill by requiring pipelines if, among other factors, they are feasible and environmentally preferable. This stipulation may also be used to specify the location where pipelines come to shore.

Stipulation No. 4. Industry Site-Specific Monitoring Program for Marine Mammal Subsistence Resources. Stipulation 4 may be used to require lessees to monitor activities which take place on lease blocks that are within identified marine mammal subsistence hunting areas in order to minimize the potential for impacts to subsistence hunting.

Stipulation No. 5. Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Marine Mammal Subsistence-Harvesting Activities. Stipulation 5 requires that all exploration and development and production operations – including support activities – be conducted in a manner that prevents unreasonable conflicts between the oil and gas industry and subsistence activities. Like Stipulation 4, this stipulation is designed to protect subsistence harvest practices, but may also serve to reduce potential disturbance to marine mammals.

Stipulation No. 6. Pre-Booming Requirements for Fuel Transfers. Stipulation 6 requires pre-booming during fuel transfers in order to reduce the potential impacts of a spill, should one occur during fuel transfer.

Stipulation No. 7. Measures to Minimize Effects to Spectacled and Steller's Eiders During Exploration Activities. The stipulation prohibits travel, except for emergencies or human/navigation safety, through the Ledyard Bay Critical Habitat Area by surface vessel associated with exploration and delineation drilling operations between July 1 and November 15. It also restricts operating altitudes for aircraft supporting drilling operations to above 1,500 feet above sea level over certain areas including Ledyard Bay Critical Habitat between July 1 and November 15. While designed to prevent effects to the eiders, these area and temporal restrictions may reduce effects to marine mammals from vessel and aircraft transit.

C-2. Marine Mammal Protection Act (MMPA)

All oil and gas activities described in the Final Second SEIS Scenario (Section 2.3.5., hereafter "Scenario") must comply with the Marine Mammal Protection Act (MMPA). The MMPA prohibits the unauthorized "take" of marine mammals. Under the MMPA and regulations promulgated by NMFS and USFWS (collectively, the "Services"), "take" is defined broadly to include not only "serious injury" or mortality, but also "harassment." The Services may authorize "take" of marine mammals where certain criteria are met. Specifically, the taking must:

- Be of small numbers of marine mammals
- Have no more than a "negligible impact" on those marine mammal species or stocks
- Not have an "immitigable adverse impact" on the availability of the species or stock for "subsistence" uses

Where appropriate, the Services will condition their "take" authorizations (such as Letters of Authorization and Incidental Harassment Authorizations) upon the operator's implementation of mitigation measures designed to ensure that the substantive criteria of the MMPA will be met. Over the years, several standard mitigation measures have been applied to the types of oil and gas activities described in the Scenario. The following paragraphs identify these standard mitigation measures required in MMPA "take" authorizations and briefly describe how they serve to reduce potential impacts to marine mammals.

Shutdown / power down procedures for vessels and other equipment that could operate within habitat used by marine mammals. Such procedures usually require that the equipment be shut down or powered down if a marine mammal comes within a specified radius. The purpose of this measure is to avoid injury, and to reduce the likelihood of other adverse impacts to marine mammals from exposure to high noise levels. NMFS and USFWS use the best science available to recommend appropriate sound thresholds (dB levels) to avoid/minimize adverse impacts to marine mammals under their jurisdictions. The distance from the sound source associated with those thresholds is established through acoustic modeling or onsite verification tests.

Ramp-up procedures for airgun arrays or other equipment. This procedure involves the gradual increase in emitted sound levels over a specified time period. As an example, airgun ramp up begins with firing a single airgun, and additional airguns are gradually added over a period of 20 to 40 minutes, until the desired operating level of the full array is obtained. The purpose of a ramp-procedure is to provide a gradually increasing sound so that marine mammals near source of the sound have the opportunity to move away before being exposed to sound levels that might be strong enough to cause injury.

PSOs (Protected Species Observers) on vessels, including seismic source vessels, icebreakers, drill ships, and monitoring vessels. The presence of staff dedicated to overseeing implementation of

the mitigation measures is crucial to ensuring their success. PSOs are placed on source vessels and monitor to ensure appropriate implementation of measures such as shutdown and power down measures, and for estimating potential impacts. PSOs may also be used to collect required monitoring information. PSOs are trained in species identification and many other operational and data recording procedures.

Minimum flight altitudes for all support aircraft, and/or areas to be avoided. These requirements are intended to reduce the chance of disturbing marine mammals in the water or hauled out on the ice or land. Exceptions are made for landing, takeoff, emergency situations, and unsafe flying conditions (such as poor weather or low visibility). Typically, aircraft shall not fly within 305 m (1,000 ft) of marine mammals or below 457 m (1,500 ft) above ground level or sea level (except for take-off, landing, emergency situations, and inclement weather). Aircraft flight routes will be designed to avoid overflights of seal and walrus haulouts.

Procedures for changing vessel speed, direction, or routes. Restrictions on vessel speed as well as the number of direction changes can reduce the risk of collisions, especially during conditions of poor visibility. Reduced speeds also reduce the chance that a vessel strike is lethal if it occurs. Specifying that shipping routes avoid important habitat areas where marine mammals may occur in high densities is also a means to reduce the risk of disturbance.

Decrease or shutdown of activities during certain periods of time or near certain locations. This measure is intended to avoid and minimize adverse impacts to marine mammals in particularly important habitat during biologically sensitive time periods.

Prohibition of activity within 150 m from any observed ringed seal lair and 500 m from any known polar bear den. NMFS or USFWS may require surveys to determine the presence of lairs and/or den sites.

Notification of lost equipment that could pose a danger to marine mammals. The operator shall notify BOEM or BSEE (dependent upon the type of activity), and NMFS in the event of any loss of cable, streamer, or other equipment that could pose a danger to marine mammals through entanglement.

Prohibition on drill ships and rigs and associated support vessels entering the Chukchi Sea before July 1; avoidance of the spring lead system. Unless authorized by the USFWS based upon a review of seasonal ice conditions and other factors (50 CFR 18.118 (a)(2)(iv)), vessels will not enter the Chukchi Sea prior to July 1. To minimize impacts on marine mammals and subsistence-hunting activities, the drillship and support vessels traversing north through the Bering Strait will transit through the Chukchi Sea along a route that avoids the spring lead system while allowing for the highest degree of safety regarding ice conditions and sea states.

Prohibition of vessels operating within 0.5 mi (805 m) of walrus on haul outs. When within 1,000 ft (300 m) of walrus in water, vessels will reduce speed and avoid multiple changes of direction.

Prohibition of aircraft and vessels operating within 0.5 mi (800 m) of walrus or polar bears when observed on land or ice. When polar bears are seen by aircraft, the aircraft will change route to avoid disturbing bears.

Incineration of solid food wastes onboard ships or rigs, eliminating the wastes as a potential attractant for polar bears.

C-3. Endangered Species Act

Several species found in and around the Leased Area receive protections under the Endangered Species Act (ESA). The species in the Chukchi Sea that are listed as "Endangered" or "Threatened" under the ESA are the bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, polar

bear, Steller's eider, and spectacled eider. (Note: The Pacific walrus is a candidate species under the ESA). Critical habitat has also been designated for the spectacled eider and proposed for the ringed seal. Unauthorized "take" of these species is prohibited by the ESA. The ESA requires Federal agencies to consult with the Services prior to authorizing activities that "may affect" a listed species. The purpose of the consultation process is two-fold:

- To ensure that agency-authorized activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat.
- To authorize the incidental take of listed species where appropriate through the consultation process, the Services will also require the implementation of appropriate mitigation measures to reduce the amount of incidental take that actually occurs.

Over the years, several standard or typical mitigation measures (called "terms and conditions" or "reasonable and prudent measures" by the Services) have been applied to the types of oil and gas activities described in the Scenario. These standard or typical mitigation measures are derived from Biological Opinions (BO) – the end product of formal ESA consultations. Because these mitigation measures largely mirror those implemented through the MMPA take authorization process, they are not repeated here. It should be noted that an MMPA incidental take authorization is a prerequisite to the Services' authorization of incidental take under the ESA– i.e. an authorization to "take" species listed under the ESA – within the Biological Opinion.

The full text of the terms and conditions and reasonable and prudent measures currently applicable to exploration activities conducted under Lease Sale 193, as well as other lease sales in the Beaufort and Chukchi, are available in the 2013 NMFS BO and the 2012 FWS BO. These BOs are available on BOEM's website at http://www.boem.gov/ak-consultations/. BOEM and BSEE have reinitiated Section 7 consultation with both the USFWS and NMFS on the new Scenario for Lease Sale 193 and related post-lease activities. BOEM and BSEE expect that if updated take estimates or new terms and conditions or reasonable and prudent measures are identified by the Services as part of the reinitiated consultations, they supplement the Biological Opinions and be applied to post-lease activities as mitigations, where appropriate.

APPENDIX D

Guide to Lease Stipulations

Background

Considerations in Reading the Sale 193 Lease Stipulations

Sale 193 Lease Stipulations

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Appendix D. Guide to Lease Stipulations

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D-1. Background

After the Outer Continental Shelf (OCS) Oil and Gas Lease Sale 193 (Lease Sale 193) for the Chukchi Sea Planning Area was held by the Minerals Management Service (MMS) on February 6, 2008, the U.S. Department of the Interior (DOI) restructured and reassigned responsibilities from MMS to three newly established agencies. This Appendix explains the references to the new agencies, organization titles, and regulations for the Lease Sale 193 Lease Stipulations, which are included as terms and conditions on each lease issued from Lease Sale 193. This Appendix does not alter the requirements of these Lease Stipulations for Lease Sale 193. These Lease Stipulations are addressed in this Final Second Supplemental Environmental Impact Statement.

On May 19, 2010, Department of the Interior (DOI) Secretary Ken Salazar signed Secretarial Order No. 3299 that directed the division of the MMS into three organizations, each with separate and clearly defined missions. Subsequently, MMS was renamed the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) on June 18, 2010 by Secretarial Order No. 3302. On October 1, 2010, DOI officially established the Office of Natural Resources Revenue (ONRR) within the Office of Assistant Secretary for Policy, Management and Budget. ONRR is responsible for collecting and disbursing revenues from energy production on Federal and American Indian lands and on the OCS. The ONRR's responsibilities also include auditing and compliance, investigation and enforcement, and asset management for Indian and federal lands, both onshore and offshore.

On October 1, 2011, the DOI established two new, independent bureaus– the Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM) – to carry out the offshore energy management and safety and environmental oversight missions formerly under the jurisdiction of the BOEMRE. BSEE enforces safety and environmental regulations in field operations including Permitting and Research, Inspections, Offshore Regulatory Programs, Oil Spill Response, and newly formed Training and Environmental Compliance functions. BOEM is responsible for managing development of the nation's offshore resources in an environmentally and economically responsible way. Functions include: Leasing, Plan Administration, Environmental Studies, National Environmental Policy Act (NEPA) Analysis, Resource Evaluation, Economic Analysis and the Renewable Energy Program.

D-2. Considerations in Reading the Sale 193 Lease Stipulations

The following list refers to each Lease Stipulation with previous reference to MMS, Regional Supervisor, Field Operations, and /or regulations as these references relate to the two independent bureaus –BOEM and BSEE – and the regulations.

D-2.1.1. STIPULATION NO. 1. PROTECTION OF BIOLOGICAL RESOURCES.

- The term "Regional Supervisor, Field Operations (RS/FO)" refers to the Regional Supervisor, Leasing and Plans (RS/LP) at BOEM.
- All acronyms "RS/FO" in this stipulation refer to the RS/LP at BOEM.

D-2.1.2. STIPULATION NO. 2. ORIENTATION PROGRAM.

- The regulations "30 CFR 250.211" and "250.241" are now 30 CFR 550.211 and 550.241, respectively.
- All acronyms "RS/FO" in this stipulation refer to the RS/LP at BOEM.

D-2.1.3. STIPULATION NO. 3. TRANSPORTATION OF HYDROCARBONS.

- All acronyms "RS/FO" in this stipulation refer to the Regional Supervisor, Field Operations at BSEE.

D-2.1.4. STIPULATION NO. 4. INDUSTRY SITE-SPECIFIC MONITORING PROGRAM FOR MARINE MAMMAL SUBSISTENCE RESOURCES.

- In the first paragraph:
  - All acronyms "RS/FO" in this stipulation refer to the RS/LP at BOEM. "Minerals Management Service (MMS)" in this stipulation is Bureau of Ocean Energy Management (BOEM).
- In the subsections under the second paragraph:
  - (2) - the acronym "MMS" refers BOEM
  - (4) - the acronym "RS/FO" refers to RS/LP at BOEM
  - (5) - all acronym "RS/FO" refers to RS/LP at BOEM
  - (7) - all acronyms "RS/FO" refers to RS/LP at BOEM
- In the remaining paragraphs, all acronyms "RS/FO" are now RS/LP at BOEM, and all acronyms "MMS" are now BOEM.

D-2.1.5. STIPULATION NO. 5. CONFLICT AVOIDANCE MECHANISMS TO PROTECT SUBSISTENCE WHALING AND OTHER MARINE MAMMAL SUBSISTENCE-HARVESTING ACTIVITIES.

- All acronyms "MMS" in this stipulation refer to BOEM or BSEE depending on the action.
- "[O]il-spill response plans" must be submitted to BSEE.
- "[E]xploration plan or development and production plan" will be submitted to the RS/LP at BOEM.

D-2.1.6. STIPULATION NO. 6. PRE-BOOMING REQUIREMENTS FOR FUEL TRANSFERS.

- Although the stipulation does not refer to an agency or title, for ease of reader understanding BSEE is the bureau for the oil spill response plans.

D-2.1.7. STIPULATION NO. 7. MEASURES TO MINIMIZE EFFECTS TO SPECTACLED AND STELLER'S EIDERS DURING EXPLORATION ACTIVITIES.

- Under General Conditions all acronyms "MMS" in this stipulation refer to BOEM.
- Under Lighting Protocols (1) "MMS" in this stipulation refers to RS/LP at BOEM, and regulation 30 CFR 250.203 is 30 CFR 550.203.

Leasing Activities Information

MMS

U.S. Department of the Interior
Minerals Management Service
Alaska OCS Region

Final
Lease Stipulations
Oil and Gas Lease Sale 193
Chukchi Sea
February 6, 2008

Stipulation 1. Protection of Biological Resources
Stipulation 2. Orientation Program
Stipulation 3. Transportation of Hydrocarbons
Stipulation 4. Industry Site-Specific Monitoring Program for Marine Mammal Subsistence Resources
Stipulation 5. Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Marine Mammal Subsistence-Harvesting Activities
Stipulation 6. Pre-Booming Requirements for Fuel Transfers
Stipulation 7. Measures to Minimize Effects to Spectacled and Steller's Eiders During Exploration Activities

Stipulation No. 1. Protection of Biological Resources. If previously unidentified biological populations or habitats that may require additional protection are identified in the lease area by the Regional Supervisor, Field Operations (RS/FO), the RS/FO may require the lessee to conduct biological surveys to determine the extent and composition of such biological populations or habitats. The RS/FO shall give written notification to the lessee of the RS/FO's decision to require such surveys.

Based on any surveys that the RS/FO may require of the lessee or on other information available to the RS/FO on special biological resources, the RS/FO may require the lessee to:

(1) Relocate the site of operations;
(2) Establish to the satisfaction of the RS/FO, on the basis of a site-specific survey, either that such operations will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist;
(3) Operate during those periods of time, as established by the RS/FO, that do not adversely affect the biological resources; and/or

(4) Modify operations to ensure that significant biological populations or habitats deserving protection are not adversely affected.

If any area of biological significance should be discovered during the conduct of any operations on the lease, the lessee shall immediately report such finding to the RS/FO and make every reasonable effort to preserve and protect the biological resource from damage until the RS/FO has given the lessee direction with respect to its protection.

The lessee shall submit all data obtained in the course of biological surveys to the RS/FO with the locational information for drilling or other activity. The lessee may take no action that might affect the biological populations or habitats surveyed until the RS/FO provides written directions to the lessee with regard to permissible actions.

Stipulation No. 2. Orientation Program. The lessee shall include in any exploration plan (EP) or development and production plan (DPP) submitted under 30 CFR 250.211 and 250.241 a proposed orientation program for all personnel involved in exploration or development and production activities (including personnel of the lessee's agents, contractors, and subcontractors) for review and approval by the RS/FO. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the sale and adjacent areas. The program shall address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals and provide guidance on how to avoid disturbance. This guidance will include the production and distribution of information cards on endangered and/or threatened species in the sale area. The program shall be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating. The orientation program shall also include information concerning avoidance of conflicts with subsistence activities and pertinent mitigation.

The program shall be attended at least once a year by all personnel involved in onsite exploration or development and production activities (including personnel of the lessee's agents, contractors, and subcontractors) and all supervisory and managerial personnel involved in lease activities of the lessee and its agents, contractors, and subcontractors.

The lessee shall maintain a record of all personnel who attend the program onsite for so long as the site is active, not to exceed 5 years. This record shall include the name and date(s) of attendance of each attendee.

Stipulation No. 3. Transportation of Hydrocarbons. Pipelines will be required: (a) if pipeline rights-of-way can be determined and obtained; (b) if laying such pipelines is technologically feasible and environmentally preferable; and (c) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple-use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to recommendations of any Federal, State, and local governments and industry.

Following the development of sufficient pipeline capacity, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of an emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the RS/FO.

Stipulation No. 4. Industry Site-Specific Monitoring Program for Marine Mammal Subsistence Resources. A lessee proposing to conduct exploration operations, including ancillary seismic surveys, on a lease within the blocks identified below during periods of subsistence use related to bowhead whales, beluga whales, ice seals, walruses, and polar bears will be required to conduct a site-specific monitoring program approved by the RS/FO, unless, based on the size, timing, duration, and scope of the proposed operations, the RS/FO, in consultation with appropriate agencies and co-management organizations, determines that a monitoring program is not necessary. Organizations currently recognized by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) for the co-management of the marine mammals resources are the Alaska Eskimo Whaling Commission, the Alaska Beluga Whale Committee, the Alaska Eskimo Walrus Commission, the Ice Seal Commission, and the Nanuk Commission. The RS/FO will provide the appropriate agencies and co-management organizations a minimum of 30 calendar days, but no longer than 60 calendar days, to review and comment on a proposed monitoring program prior to Minerals Management Service (MMS) approval. The monitoring program must be approved each year before exploratory drilling operations can be commenced.

The monitoring program will be designed to assess when bowhead and beluga whales, ice seals, walruses, and polar bears are present in the vicinity of lease operations and the extent of behavioral effects on these marine mammals due to these operations. In designing the program, the lessee must consider the potential scope and extent of effects that the type of operation could have on these marine mammals. Experiences relayed by subsistence hunters indicate that, depending on the type of operations, some whales demonstrate avoidance behavior at distances of up to 35 miles. The program must also provide for the following:

(1) Recording and reporting information on sighting of the marine mammals of concern and the extent of behavioral effects due to operations;
(2) Coordinating the monitoring logistics beforehand with the MMS Bowhead Whale Aerial Survey Project and other mandated aerial monitoring programs;
(3) Inviting a local representative, to be determined by consensus of the appropriate co-management organizations, to participate as an observer in the monitoring program;
(4) Submitting daily monitoring results to the RS/FO;
(5) Submitting a draft report on the results of the monitoring program to the RS/FO within 90 days following the completion of the operation. The RS/FO will distribute this draft report to the appropriate agencies and co-management organizations;
(6) Allowing 30 days for independent peer review of the draft monitoring report; and
(7) Submitting a final report on the results of the monitoring program to the RS/FO within 30 days after the completion of the independent peer review. The final report will include a discussion of the results of the peer review of the draft report. The RS/FO will distribute this report to the appropriate agencies and co-management organizations.

The RS/FO may extend the report review and submittal timelines if the RS/FO determines such an extension is warranted to accommodate extenuating circumstances.

The lessee will be required to fund an independent peer review of a proposed monitoring plan and the draft report on the results of the monitoring program for bowhead whales. The lessee may be required to fund an independent peer review of a proposed monitoring plan and the draft report on the results of the monitoring program for other co-managed marine mammal resources. This peer review will consist of independent reviewers who have knowledge and experience in statistics, monitoring marine mammal behavior, the type and extent of the proposed operations, and an awareness of traditional knowledge. The peer reviewers will be selected by the RS/FO from experts recommended by the appropriate agencies and co-management resource organizations. The results of these peer reviews will be provided to the RS/FO for consideration in final MMS approval of the monitoring program and the final report, with copies to the appropriate agencies and co-management organizations.

In the event the lessee is seeking a Letter of Authorization (LOA) or Incidental Harassment Authorization (IHA) for incidental take from NMFS and/or FWS, the monitoring program and review process required under the LOA or IHA may satisfy the requirements of this stipulation. The lessee must advise the RS/FO when it is seeking an LOA or IHA in lieu of meeting the requirements of this stipulation and must provide the RS/FO with copies of all pertinent submittals and resulting correspondence. The RS/FO will coordinate with the NMFS and/or FWS and will advise the lessee if the LOA or IHA will meet these requirements.

The MMS, NMFS, and FWS will establish procedures to coordinate results from site-specific surveys required by this stipulation and the LOA's or IHA's to determine if further modification to lease operations are necessary.

This stipulation applies to the following blocks:

NR02-06, Chukchi Sea:
6624, 6625, 6674, 6675, 6723-6725, 6773-6775, 6822, 6823, 6872

NR03-02, Posey:
6872, 6873, 6918-6923, 6967-6973, 7016-7023, 7063-7073, 7112-7123

NR03-03, Colbert
6674, 6723, 6724, 6771-6774, 6820-6824, 6869-6874, 6918-6924, 6966-6974, 7015-7024, 7064-7074, 7113-7124

NR03-04, Solivik Island
6011-6023, 6060-6073, 6109-6122, 6157-6171, 6206-6219, 6255-6268, 6305-6317, 6354-6365, 6403-6414, 6453-6462, 6502-6511, 6552-6560, 6601-6609, 6651-6658, 6701-6707, 6751-6756, 6801-6805, 6851-6854, 6901-6903, 6951, 6952, 7001

NR03-05, Point Lay West
6014-6024, 6062-6073, 6111-6122, 6160-6171, 6209-6221, 6258-6269, 6307-6317, 6356-6365, 6406-6414, 6455-6462, 6503-6510, 6552-6558, 6602-6606, 6652-6655, 6702, 6703

NR04-01, Hanna Shoal
6223, 6267-6273, 6315-6323, 6363-6373, 6411-6423, 6459-6473, 6507-6523, 6556-6573, 6605-6623, 6654-6671, 6703-6721, 6752-6771, 6801-6819, 6851-6868, 6901-6916, 6951-6964, 7001-7010, 7051-7059, 7101-7107

NR04-02, Barrow
6003-6022, 6052-6068, 6102-6118, 6151-6164, 6201-6214, 6251-6262, 6301-6312, 6351-6359, 6401-6409, 6451-6456, 6501-6506, 6551, 6552, 6601, 6602

NR04-03, Wainwright
6002-6006, 6052, 6053

NS04-08, (Unnamed)
6816-6822, 6861-6872, 6910-6922, 6958-6972, 7007-7022, 7055-7072, 7104-7122

This stipulation applies during the time periods for subsistence-harvesting described below for each community.

Subsistence Whaling and Marine Mammal Hunting Activities by Community

Barrow: Spring bowhead whaling occurs from April to June; Barrow hunters hunt from ice leads from Point Barrow southwestward along the Chukchi Sea coast to the Skull Cliff area. Fall whaling occurs from August to October in an area extending from approximately 10 miles west of Barrow to the east side of Dease Inlet. Beluga whaling occurs from April to June in the spring leads between Point Barrow and Skull Cliff; later in the season, belugas are hunted in open water around the barrier islands off Elson Lagoon. Walrus are harvested from June to September from west of Barrow southwestward to Peard Bay. Polar bear are hunted from October to June generally in the same vicinity used to hunt walrus. Seal hunting occurs mostly in winter, but some open-water sealing is done from the Chukchi coastline east as far as Dease Inlet and Admiralty Bay in the Beaufort Sea.

Wainwright: Bowhead whaling occurs from April to June in the spring leads offshore of Wainwright, with whaling camps sometimes as far as 10 to 15 miles from shore. Wainwright hunters hunt beluga whales in the spring lead system from April to June but only if no bowheads are in the area. Later in the summer, from July to August, belugas can be hunted along the coastal lagoon systems. Walrus hunting occurs from July to August at the southern edge of the retreating pack ice. From August to September, walrus can be hunted at local haulouts with the focal area from Milliktagvik north to Point Franklin. Polar bear hunting occurs primarily in the fall and winter around Icy Cape, at the headland from Point Belcher to Point Franklin, and at Seahorse Island.

Point Lay: Because Point Lay's location renders it unsuitable for bowhead whaling, beluga whaling is the primary whaling pursuit. Beluga whales are harvested from the middle of June to the middle of July. The hunt is concentrated in Naokak and Kukpowruk Passes south of Point Lay where hunters use boats to herd the whales into the shallow waters of Kasegaluk Lagoon where they are hunted. If the July hunt is

unsuccessful, hunters can travel as far north as Utukok Pass and as far south as Cape Beaufort in search of whales. When ice conditions are favorable, Point Lay residents hunt walrus from June to August along the entire length of Kasegaluk Lagoon, south of Icy Cape, and as far as 20 miles offshore. Polar bear are hunted from September to April along the coast, rarely more than 2 miles offshore.

Point Hope: Bowhead whales are hunted from March to June from whaling camps along the ice edge south and southeast of the point. The pack-ice lead is rarely more than 6 to 7 miles offshore. Beluga whales are harvested from March to June in the same area used for the bowhead whale hunt. Beluga whales can also be hunted in the open water later in the summer from July to August near the southern shore of Point Hope close to the beaches, as well as areas north of the point as far as Cape Dyer. Walruses are harvested from May to July along the southern shore of the point from Point Hope to Akoviknak Lagoon. Point Hope residents hunt polar bears primarily from January to April and occasionally from October to January in the area south of the point and as far out as 10 miles from shore.

This stipulation will remain in effect until termination or modification by the Department of the Interior after consultation with appropriate agencies.

Stipulation No. 5. Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Marine Mammal Subsistence-Harvesting Activities. Exploration and development and production operations shall be conducted in a manner that prevents unreasonable conflicts between the oil and gas industry and subsistence activities. This stipulation applies to exploration, development, and production operations on a lease within the blocks identified below during periods of subsistence use related to bowhead whales, beluga whales, ice seals, walruses, and polar bears. The stipulation also applies to support activities, such as vessel and aircraft traffic, that traverse the blocks listed below or Federal waters landward of the sale during periods of subsistence use regardless of lease location. Transit for human safety emergency situations shall not require adherence to this stipulation.

This stipulation applies to the following blocks:

NR02-06, Chukchi Sea:
6624, 6625, 6674, 6675, 6723-6725, 6773-6775, 6822, 6823, 6872

NR03-02, Posey:
6872, 6873, 6918-6923, 6967-6973, 7016-7023, 7063-7073, 7112-7123

NR03-03, Colbert
6674, 6723, 6724, 6771-6774, 6820-6824, 6869-6874, 6918-6924, 6966-6974, 7015-7024, 7064-7074, 7113-7124

NR03-04, Solivik Island
6011-6023, 6060-6073, 6109-6122, 6157-6171, 6206-6219, 6255-6268, 6305-6317, 6354-6365, 6403-6414, 6453-6462, 6502-6511, 6552-6560, 6601-6609, 6651-6658, 6701-6707, 6751-6756, 6801-6805, 6851-6854, 6901-6903, 6951, 6952, 7001

NR03-05, Point Lay West
6014-6024, 6062-6073, 6111-6122, 6160-6171, 6209-6221, 6258-6269, 6307-6317, 6356-6365, 6406-6414, 6455-6462, 6503-6510, 6552-6558, 6602-6606, 6652-6655, 6702, 6703

NR04-01, Hanna Shoal
6223, 6267-6273, 6315-6323, 6363-6373, 6411-6423, 6459-6473, 6507-6523, 6556-6573, 6605-6623, 6654-6671, 6703-6721, 6752-6771, 6801-6819, 6851-6868, 6901-6916, 6951-6964, 7001-7010, 7051-7059, 7101-7107

NR04-02, Barrow
6003-6022, 6052-6068, 6102-6118, 6151-6164, 6201-6214, 6251-6262, 6301-6312, 6351-6359, 6401-6409, 6451-6456, 6501-6506, 6551, 6552, 6601, 6602

NR04-03, Wainwright
6002-6006, 6052, 6053

NS04-08, (Unnamed)
6816-6822, 6861-6872, 6910-6922, 6958-6972, 7007-7022, 7055-7072, 7104-7122

Prior to submitting an exploration plan or development and production plan (including associated oil-spill response plans) to the MMS for activities proposed during subsistence-use critical times and locations described below for bowhead whale and other marine mammals, the lessee shall consult with the North Slope Borough, and with directly affected subsistence communities (Barrow, Point Lay, Point Hope, or Wainwright) and co-management organizations to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures that could be implemented by the operator to prevent unreasonable conflicts. Organizations currently recognized by the NMFS and the FWS for the co-management of the marine mammals resources are the Alaska Eskimo Whaling Commission, the Alaska Beluga Whale Committee, the Alaska Eskimo Walrus Commission, the Ice Seal Commission, and the Nanuk Commission. Through this consultation, the lessee shall make every reasonable effort, including such mechanisms as a conflict avoidance agreement, to assure that exploration, development, and production activities are compatible with whaling and other marine mammal subsistence hunting activities and will not result in unreasonable interference with subsistence harvests.

A discussion of resolutions reached during this consultation process and plans for continued consultation shall be included in the exploration plan or the development and production plan. In particular, the lessee shall show in the plan how its activities, in combination with other activities in the area, will be scheduled and located to prevent unreasonable conflicts with subsistence activities. The lessee shall also include a discussion of multiple or simultaneous operations, such as ice management and seismic activities, that can be expected to occur during operations in order to more accurately assess the potential for any cumulative affects. Communities, individuals, and other entities who were involved in the consultation shall be identified in the plan. The RS/FO shall send a copy of the exploration plan or development and production plan (including associated oil-spill response plans) to the directly affected communities and the appropriate co-management organizations at the time the plans are submitted to the MMS to allow concurrent review and comment as part of the plan approval process.

In the event no agreement is reached between the parties, the lessee, NMFS, FWS, the appropriate co-management organizations, and any communities that could be directly affected by the proposed activity may request that the RS/FO assemble a group consisting of representatives from the parties to specifically address the conflict and attempt to resolve the issues. The RS/FO will invite appropriate parties to a meeting if the RS/FO determines such a meeting is warranted and relevant before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests.

The lessee shall notify the RS/FO of all concerns expressed by subsistence hunters during operations and of steps taken to address such concerns. Activities on a lease may be restricted if the RS/FO determines it is necessary to prevent unreasonable conflicts with local subsistence hunting activities.

In enforcing this stipulation, the RS/FO will work with other agencies and the public to assure that potential conflicts are identified and efforts are taken to avoid these conflicts.

Subsistence-harvesting activities occur generally in the areas and time periods listed below.

Subsistence Whaling and Marine Mammal Hunting Activities by Community

Barrow: Spring bowhead whaling occurs from April to June; Barrow hunters hunt from ice leads from Point Barrow southwestward along the Chukchi Sea coast to the Skull Cliff area; fall whaling occurs from August to October in an area extending from approximately 10 miles west of Barrow to the east side of Dease Inlet. Beluga whaling occurs from April to June in the spring leads between Point Barrow and Skull Cliff; later in the season, belugas are hunted in open water around the barrier islands off Elson Lagoon. Walrus are harvested from June to September from west of Barrow southwestward to Peard Bay. Polar bear are hunted from October to June generally in the same vicinity used to hunt walruses. Seal hunting occurs mostly in winter, but some open-water sealing is done from the Chukchi coastline east as far as Dease Inlet and Admiralty Bay in the Beaufort Sea.

Wainwright: Bowhead whaling occurs from April to June in the spring leads offshore of Wainwright, with whaling camps sometimes as far as 10 to 15 miles from shore. Wainwright hunters hunt beluga whales in the spring lead system from April to June but only if no bowheads are in the area. Later in the summer, from July to August, belugas can be hunted along the coastal lagoon systems. Walrus hunting occurs from July to August at the southern edge of the retreating pack ice. From August to September, walruses can be hunted at local haulouts with the focal area from Milliktagvik north to Point Franklin. Polar bear hunting occurs primarily in the fall and winter around Icy Cape, at the headland from Point Belcher to Point Franklin, and at Seahorse Island.

Point Lay: Because Point Lay's location renders it unsuitable for bowhead whaling, beluga whaling is the primary whaling pursuit. Beluga whales are harvested from the middle of June to the middle of July. The hunt is concentrated in Naokak and Kukpowruk Passes south of Point Lay where hunters use boats to herd the whales into the shallow waters of Kasegaluk Lagoon where they are hunted. If the July hunt is

unsuccessful, hunters can travel as far north as Utukok Pass and as far south as Cape Beaufort in search of whales. When ice conditions are favorable, Point Lay residents hunt walruses from June to August along the entire length of Kasegaluk Lagoon, south of Icy Cape, and as far as 20 miles offshore. Polar bears are hunted from September to April along the coast, rarely more than 2 miles offshore.

Point Hope: Bowhead whales are hunted from March to June from whaling camps along the ice edge south and southeast of the point. The pack-ice lead is rarely more than 6 to 7 miles offshore. Beluga whales are harvested from March to June in the same area used for the bowhead whale hunt. Beluga whales can also be hunted in the open water later in the summer from July to August near the southern shore of Point Hope close to the beaches, as well as areas north of the point as far as Cape Dyer. Walruses are harvested from May to July along the southern shore of the point from Point Hope to Akoviknak Lagoon. Point Hope residents hunt polar bears primarily from January to April and occasionally from October to January in the area south of the point and as far out as 10 miles from shore.

Stipulation No. 6. Pre-Booming Requirements for Fuel Transfers. Fuel transfers (excluding gasoline transfers) of 100 barrels or more will require pre-booming of the fuel barge(s). The fuel barge must be surrounded by an oil-spill-containment boom during the entire transfer operation to help reduce any adverse effects from a fuel spill. The lessee's oil spill response plans must include procedures for the pre-transfer booming of the fuel barge(s).

Stipulation No. 7. Measures to Minimize Effects to Spectacled and Steller's Eiders During Exploration Activities. This stipulation will minimize the likelihood that spectacled and Steller's eiders will strike drilling structures or vessels. The stipulation also provides additional protection to eiders within the blocks listed below and Federal waters landward of the sale area, including the Ledyard Bay Critical Habitat Area, during times when eiders are present.

(A) General conditions: The following conditions apply to all exploration activities.

(1) An EP must include a plan for recording and reporting bird strikes. All bird collisions (with vessels, aircraft, or drilling structures) shall be documented and reported within 3 days to MMS. Minimum information will include species, date/time, location, weather, identification of the vessel, and aircraft or drilling structure involved and its operational status when the strike occurred. Bird photographs are not required, but would be helpful in verifying species. Lessees are advised that the FWS does not recommend recovery or transport of dead or injured birds due to avian influenza concerns.

(2) The following conditions apply to operations conducted in support of exploratory and delineation drilling.

(a) Surface vessels (e.g., boats, barges) associated with exploration and delineation drilling operations should avoid operating within or traversing the listed blocks or Federal waters between the listed blocks and the coastline between April 15 and June 10, to the maximum extent practicable. If surface vessels must traverse this area during this period, the surface vessel operator will have ready access to wildlife hazing equipment (including at least three *Breco* buoys or similar devices) and

personnel trained in its use; hazing equipment may located onboard the vessel or on a nearby oil spill response vessel, or in Point Lay or Wainwright. Lessees are required to provide information regarding their operations within the area upon request of MMS. The MMS may request information regarding number of vessels and their dates of operation within the area.

(b) Except for emergencies or human/navigation safety, surface vessels associated with exploration and delineation drilling operations will avoid travel within the Ledyard Bay Critical Habitat Area between July 1 and November 15. Vessel travel within the Ledyard Bay Critical Habitat Area for emergencies or human/navigation safety shall be reported within 24 hours to MMS.

(c) Aircraft supporting drilling operations will avoid operating below 1,500 feet above sea level over the listed blocks or Federal waters between the listed blocks and the coastline between April 15 and June 10, or the Ledyard Bay Critical Habitat Area between July 1 and November 15, to the maximum extent practicable. If weather prevents attaining this altitude, aircraft will use pre-designated flight routes. Pre-designated flight routes will be established by the lessee and MMS, in collaboration with the FWS, during review of the EP. Route or altitude deviations for emergencies or human safety shall be reported within 24 hours to MMS.

(B) Lighting Protocols. The following lighting requirements apply to activities conducted between April 15 and November 15 of each year.

(1) Drilling Structures: Lessees must adhere to lighting requirements for all exploration or delineation drilling structures so as to minimize the likelihood that migrating marine and coastal birds will strike these structures. Lessees are required to implement lighting requirements aimed at minimizing the radiation of light outward from exploration or delineation drilling structures to minimize the likelihood that birds will strike those structures. These requirements establish a coordinated process for a performance-based objective rather than pre-determined prescriptive requirements. The performance-based objective is to minimize the radiation of light outward from exploration/delineation structures while operating on a lease or if staged within nearshore Federal waters pending lease deployment.

Measures to be considered include but need not be limited to the following:

- Shading and/or light fixture placement to direct light inward and downward to living and work structures while minimizing light radiating upward and outward;
- Types of lights;
- Adjustment of the number and intensity of lights as needed during specific activities;
- Dark paint colors for selected surfaces;
- Low-reflecting finishes or coverings for selected surfaces; and
- Facility or equipment configuration.

Lessees are encouraged to consider other technical, operational, and management approaches that could be applied to their specific facilities and operations to reduce

outward light radiation. Lessees must provide MMS with a written statement of measures that will be or have been taken to meet the lighting objective, and must submit this information with an EP when it is submitted for regulatory review and approval pursuant to 30 CFR 250.203.

(2) Support Vessels: Surface support vessels will minimize the use of high-intensity work lights, especially when traversing the listed blocks and federal waters between the listed blocks and the coastline. Exterior lights will be used only as necessary to illuminate active, on-deck work areas during periods of darkness or inclement weather (such as rain or fog), otherwise they will be turned off. Interior lights and lights used during navigation could remain on for safety.

For the purpose of this stipulation, the listed blocks are as follows:

NR02-06, Chukchi Sea:
6624, 6625, 6674, 6675, 6723-6725, 6773-6775, 6822, 6823, 6872

NR03-02, Posey:
6872, 6873, 6918-6923, 6967-6973, 7016-7023, 7063-7073, 7112-7123

NR03-03, Colbert
6674, 6723, 6724, 6771-6774, 6820-6824, 6869-6874, 6918-6924, 6966-6974, 7015-7024, 7064-7074, 7113-7124

NR03-04, Solivik Island
6011-6023, 6060-6073, 6109-6122, 6157-6171, 6206-6219, 6255-6268, 6305-6317, 6354-6365, 6403-6414, 6453-6462, 6502-6511, 6552-6560, 6601-6609, 6651-6658, 6701-6707, 6751-6756, 6801-6805, 6851-6854, 6901-6903, 6951, 6952, 7001

NR03-05, Point Lay West
6014-6024, 6062-6073, 6111-6122, 6160-6171, 6209-6221, 6258-6269, 6307-6317, 6356-6365, 6406-6414, 6455-6462, 6503-6510, 6552-6558, 6602-6606, 6652-6655, 6702, 6703

NR04-01, Hanna Shoal
6223, 6267-6273, 6315-6323, 6363-6373, 6411-6423, 6459-6473, 6507-6523, 6556-6573, 6605-6623, 6654-6671, 6703-6721, 6752-6771, 6801-6819, 6851-6868, 6901-6916, 6951-6964, 7001-7010, 7051-7059, 7101-7107

NR04-02, Barrow
6003-6022, 6052-6068, 6102-6118, 6151-6164, 6201-6214, 6251-6262, 6301-6312, 6351-6359, 6401-6409, 6451-6456, 6501-6506, 6551, 6552, 6601, 6602

NR04-03, Wainwright
6002-6006, 6052, 6053

NS04-08, (Unnamed)
6816-6822, 6861-6872, 6910-6922, 6958-6972, 7007-7022, 7055-7072, 7104-7122

Nothing in this stipulation is intended to reduce personnel safety or prevent compliance with other regulatory requirements (e.g., U.S. Coast Guard or Occupational Safety and Health Administration) for marking or lighting of equipment and work areas.

Appendix E: Response to Comments

Section 1: Response to Comments
Section 2: Hearing Transcripts
Section 3: Public Comments

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Acronyms and Abbreviations

$\mu g/m^3$	Micrograms per cubic meter
AAC	Alaska Administrative Code
ABL	Air boundary layer
ACIA	Arctic Climate Impact Assessment
ACP	Arctic Coastal Plain
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AEWC	Alaska Eskimo Whaling Commission
AFMP	Arctic Fishery Management Plan
AGL	Above Ground Level
AI/AN	American Indian and Alaskan Native populations
AMAP	Arctic Monitoring and Assessment Programme
ANC	Alaska Nanuuq Commission
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Land Conservation Act
ANS	Aquatic Nuisance Species or Alaska North Slope
ANSO	Alaska North Slope Oil
ANWR	Arctic National Wildlife Refuge
AOCSR	Alaska OCS Region
APD	Application for Permit to Drill
API	American Petroleum Institute
APPS	U.S. Act to Prevent Pollution from Ships
AQRP	Air Quality Regulatory Program
ARBO	Arctic Region Biological Opinion
ARRT	Alaska Regional Response Team
ASAMM	Aerial Surveys of Arctic Marine Mammals
ASL	Above Sea Level
ASRC	Arctic Slope Regional Corporation
ASWG	Alaska Shorebird Working Group
atm	Atmosphere (of Pressure)
AVALON/MERLIN	Integration of Avalon Nodal Analysis program and Merlin Oil and Gas Reservoir Simulator
AWC	Anadromous Waters Catalog of Alaska
B.P.	Before Present
BACT	Best Available Control Technology
Bbbl	Billion barrels of oil
bbls/d	Barrels of oil per day
bbl	Barrels of oil
BC	Black Carbon
BCB	Bering-Chukchi-Beaufort Seas Stock of Bowhead Whales
Bcf	Billion Cubic Feet
Bcfg	Billion Cubic Feet of Gas
BE	Biological Evaluation
BLM	Bureau of Land Management
BO	Biological Opinion
BOEMRE	Bureau of Ocean Energy Management, Regulation, and Enforcement

BOEM	Bureau of Ocean Energy Management
BOP	Blowout Preventer (System)
BP	British Petroleum
BPXA	British Petroleum Exploration (Alaska)
BS	Boundary segment(s)
BSEE	Bureau of Safety and Environmental Enforcement
CAA	Clean Air Act or Conflict Avoidance Agreement
CAH	Central Arctic (Caribou) Herd
CBD	Center for Biological Diversity
CBS	Chukchi/Bering Seas Stock of Polar Bears
CEQ	Council on Environmental Quality
CER	Categorical Exclusion Review
CFCs	Chlorofluorocarbons
CFR	Code of Federal Regulations
CH_4	Methane
CI	Confidence Interval
CIAP	Coastal Impact Assistance Program
CIP	Capital Improvement Program
CO	Carbon Monoxide
CO_2	Carbon dioxide
cp	Centipoise (Measure of Viscosity)
CPAI	Conoco Phillips Alaska Incorporated
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
CZMA	Coastal Zone Management Act
DEW	Distant Early Warning (system)
District Court	United States District Court for the District of Alaska
DO	Dissolved Oxygen
DPP	Development and Production Plan
Draft EIS	Draft Environmental Impact Statement
Draft SEIS	Draft Supplemental Environmental Impact Statement
DWH	Deepwater Horizon
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EP	Exploration Plan
ERA	Environmental Resource Area
ESA	Endangered Species Act
ESI	Environmental sensitivity index
EWC	Eskimo Walrus Commission
FEIS	Final Environmental Impact Statement
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FOSC	Federal On-Scene Coordinator
FR	Federal Register
FSB	Federal Subsistence Board

FWPCA	Federal Water Pollution Control Act
G&G	Geological and Geophysical
g/m^3	Grams per cubic meter
g/min	Grams per minute
GLS	Grouped land segments
GOM	Gulf of Mexico
H_2S	Hydrogen sulfide
HCs	Hydrocarbons
HSWUA	Hanna Shoal Walrus Use Area
Hz	Hertz
IAP	Integrated Activity Plan
ICAS	Inupiat Community of the Arctic Slope
ID	Identification number
IHA	Incidental Harassment Authorization
IMO	International Maritime Organization
INC	Incident of Non-Compliance
IPCC	Intergovernmental Panel on Climate Change
IPF	Impact producing factor
ISB	In-situ Burn
ISC	Ice Seal Committee
ISER	Institute for Social and Economic Research
ITA	Incidental Take Authorization
ITL	Information to Lessees (Clauses)
ITR	Incidental Tale Regulation
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
LA	Launch Area
LNG	Liquefied Natural Gas
LOA	Letter of Authorization
LOWC	Loss of Well Control
LPG	Liquid Petroleum Gas
LS	Land Segment
LTO	Landing and Takeoff Cycle
MAIs	Maximum allowable increases
MARPOL	International Convention for the Prevention of Pollution from Ships
Mbbl	Thousand Barrels
MBTA	Migratory Bird Treaty Act
Mcf	Thousand Cubic Feet
Mcf/d	Thousand Cubic Feet per Day
Mcfg	Thousand Cubic Feet of Gas
md	Millidarcy (Measure of Permeability)
MMbbls	Million Barrels
MMC	Marine Mammal Commission
MMcf	Million Cubic Feet
MMcfg	Million Cubic Feet of Gas
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MODU	Mobile Offshore Drilling Unit
MOU	Memorandum of Understanding

MOVES	Motor Vehicle Emissions Simulator
MWCS	Marine Well Containment System
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGL	Natural gas liquids
NHPA	National Historic Preservation Act
NISA	National Invasive Species Act of 1996
NMFS	National Marine Fisheries Service
NO_2	Nitrogen dioxide
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of Intent
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPFMC	North Pacific Fisheries Management Council
NPR-A	National Petroleum Reserve in Alaska
NPS	National Park Service
NRC	National Research Council or National Response Center
NSB	North Slope Borough
NSBMC	North Slope Borough Municipal Code
NSBSAC	North Slope Borough Science Advisory Committee
NSIDC	National Snow and Ice Data Center
NTACs	Nondiscretionary Terms and Conditions
NTL	Notice to Lessees
NWAB	Northwest Arctic Borough
O_3	Ozone
OCRM	Ocean and Coastal Resource Management
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
OPA/OPA-90	Oil Pollution Act of 1990
OSFR	Oil-Spill Financial Responsibility
OSRA	Oil-Spill Risk Analysis
OSRP	Oil-Spill Response Plan
OWM	Oil weathering model
PAC	Pacific OCS Region
PACs	Polyaromatic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
PEA	Programmatic Environmental Assessment
PL	Pipeline segment
PM	Particulate Matter
PM_{10}	Coarse particulate matter with an aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	Fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less
PSD	Prevention of Significant Deterioration
psi	Pounds per square inch
RCRA	Resource Conservation and Recovery Act
RD	Regional Director
ROD	Record of Decision
ROI	Record of Increase

ROMS	Regional Ocean Modeling System
ROW	Right-of-Way
RP	Responsible Party or Recommended Practice
RPMs	Reasonably Prudent Measures
RS/FO	Regional Supervisor/Field Operations
RSV	Royalty Suspension Volume
RUSALCA	Russian-American Long-term Census of the Arctic
Sale 193	Chukchi Sea OCS Lease Sale 193
SBS	Southern Beaufort Sea Stock Of Polar Bears
scf	Standard Cubic Foot
SDH	Social Determinants of Health
Secretary	Secretary of the Interior
SEIS	Supplemental Environmental Impact Statement
SEMS	Safety and Environmental Management Systems
SIP	State Implementation Plan
SLA	Submerged Lands Act
SLS	Spring Lead System
SO_2	Sulfur Dioxide
SO4	Sulfate
stb	Stock-Tank Or Standard Barrel
TAPS	Trans-Alaska Pipeline System
Tcf	Trillion Cubic Feet
Tcfg	Trillion Cubic Feet of Gas
TEK	Traditional Environmental Knowledge
TLH	Teshekpuk Lake (Caribou) Herd
TSP	Total Suspended Particles
UAF	University of Alaska, Fairbanks
UERR	Undiscovered Economically Recoverable Resources
ULSD	Ultra-low Sulfur Diesel Fuel
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	United States Coast Guard
USDOC	U.S. Department of Commerce
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USFDA	U.S. Food and Drug Administration
USGS	U.S. Geological Survey
UTRR	Undiscovered Technically Recoverable Resources
UV	Ultraviolet
VLOS	Very Large Oil Spill
VOC	Volatile Organic Compounds
VSM	Vertical Support Member (Supports above ground oil and gas pipelines)
WAH	Western Arctic (Caribou) Herd
WCD	Worst Case Discharge

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Introduction

In response to the April 24, 2014, U.S. District Court for the District of Alaska remand, BOEM has produced a Supplemental EIS (SEIS) to provide a robust analysis of potential environmental impacts of a full range of likely production from Lease Sale 193 if oil and gas production were to occur. The goal of this SEIS is to provide the decision maker, in this case the Secretary of the Interior, with relevant environmental, social, and economic information the Secretary needs to make an informed choice whether to affirm, modify or vacate Lease Sale 193.

BOEM announced availability of the Draft Second SEIS in the *Federal Register* on November 7, 2014 (79 *FR* 70554), commencing a 45-day public review and comment period that ended December 22, 2014. During this period, BOEM held six public hearings and received more than 430,000 comments.

During the public comment period, various government agencies, organizations, and individuals provided comments through oral testimony, in writing, or electronically. Appendix E and specific revisions to the Final Second SEIS provide a comprehensive response to these comments.

BOEM's response to the comments involved a thorough review of both oral testimony received at public hearings and each written and electronic comment the Bureau received. BOEM grouped all relevant, substantive comments into particular ***issue categories*** identified during this review. BOEM grouped comments as they pertain to specific issues or impacts to resource areas that could result from the full range of development and production from Lease Sale 193 in the Chukchi Sea.

Each issue category includes a:

- **Summary of Comments:** Defines and summarizes the issue in each issue category.
- **Source of Comments**: Lists the types of governments, tribes, organizations, or other groups who submitted comments. Individual comments from the public are shown under a collective heading of "General Public." The comments include form letters facilitated by non-governmental organizations that focus on environmental or economic issues.
- **Response to Comments:** BOEM's collective response to the comments that constitute the particular issue.

A great number of the comments BOEM received via e-mail or compact disk were identical form letters or slight variations of those form letters. BOEM provided responses for relevant and substantive comments. Responses are not always provided in instances where a submittal does not comment on the content of the SEIS, but instead offers a general opinion or simply recommends a specific decision that is not delegated to the Bureau. In some instances, BOEM provides responses to some recurring issues—even when not directly relevant to the SEIS—to better communicate the nature of the OCS Program and the NEPA process.

BOEM received and considered many comments of an editorial nature; for example: suggested word changes and corrections, requests for clarification, questions regarding citations, and similar. Where appropriate, BOEM made these suggested revisions to the Final Second SEIS, and these revisions constitute BOEM's response to those editorial comments.

All relevant, substantive comments received by BOEM during the comment period are included within this volume of the Final Second SEIS. All comments received became part of the public record. These comments are available to the decision maker during the deliberation process when deciding between the lease sale alternatives analyzed in the 2007 FEIS, the 2011 Final SEIS, and the Final Second SEIS.

Issue 1. Science-based Decision Making

Summary of Comments

Many comments emphasized that decisions related to offshore oil and gas activities must be based on the best available information. These comments stated it is essential to acquire information about the Chukchi Sea ecosystem before drilling. Many comments reference "widely acknowledged gaps in scientific information" and state that baseline data is still needed for the Chukchi Sea. Many comments underscore a need for continued data collection in light of climate change; for instance:

> We need to better understand how the Chukchi Sea and the resources that our community members depend upon are responding to climate change and human activities. This information is absolutely essential if appropriate mitigation measures are to be developed to identify causes, as ecosystem changes continue to occur, and for damage assessment and compensation in the event of an accident.

Other comments pointed out the tremendous progress accomplished over the years. It was stated that the Federal Government and private sector have generated a substantial body of scientific literature and environmental analyses to better understand the effects of oil and gas activities in the Chukchi Sea.

One comment commended some of the more recent research proposals, but stated that research studies should be completed prior to selling leases or authorizing activities.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

BOEM is very serious about its commitment to science-based decision-making. In fulfilling its NEPA obligations through this Second SEIS, BOEM carefully analyzed each potentially affected environmental resource in and around the Proposed Action area, with due consideration for climate change and Alaska's unique environmental characteristics. BOEM's team of analysts includes experts in relevant disciplines, such as oceanography, marine biology, cultural anthropology, geology, and economics. These analysts provide focused technical analyses of all reasonably foreseeable environmental impacts associated with a hypothetical oil and gas exploration, development, and production scenarios.

BOEM Research. BOEM uses the best available science to fulfill its mandate under the OCS Lands Act to protect the environment, including Arctic wildlife. BOEM's analyses derive much of the information from BOEM's Environmental Studies Program (ESP), a robust multidisciplinary research program that identifies and obtains information on a variety of pertinent environmental issues. Since 1975, more than $450 million has been commissioned through the ESP for studies of the Alaska OCS Region. These studies yielded more than 1,000 technical reports and peer-reviewed scholarly articles. Current social research projects involving local residents on the Chukchi Sea coast include "Study of Sharing Networks to Assess the Vulnerabilities of Local Communities to Oil and Gas Development Impacts in Arctic Alaska," "Impact Monitoring for Offshore Subsistence Hunting," and "Economic

Impact Modeling." As the ESP is not a grant program, studies are most commonly procured through competitive contracting or agreements with other Federal agencies. Pursuant to 43 USC. 1346 and in anticipation of future NEPA processes, BOEM's ESP will continue to fund the collection of additional environmental information and commission additional research about the important environmental and social issues within the Chukchi Sea and North Slope region.

The Alaska Region ESP website provides information about past, current, and future research and study reports for the Alaska OCS Region at http://www.boem.gov/akstudies. Information on the ESP's systematic and aggressive research program studying and monitoring affected environments and communities on Alaska's North Slope can also be accessed from the web portal at http://www.BOEM.gov/alaska/ess/index.htm.

Studies Plan. Each autumn, BOEM's ESP publishes the Alaska Annual Studies Plan describing the Region's ongoing research and studies proposed for the coming year. The ESP distributes the annual plan to approximately 200 organizations, including the Northwest Arctic Borough, North Slope Borough, Village of Wainwright, Native Villages of Point Hope and Point Lay, Inuvialuit Beluga Whaling Committee, Maniilaq Association, Alaska Eskimo Whaling Commission, Alaska Nanuuq Commission, Eskimo Walrus Commission, and many others. Distributed with the annual studies plan is a call for suggestions of new studies from stakeholders. The general comments BOEM received on the Draft Second SEIS about the character and dimension of studies will also be included as a part of BOEM's constant effort to improve the ESP.

Ecologically Important Areas. Decades of study in the Alaska OCS Region elucidated the heightened importance of many areas across the North Slope and within the Chukchi Sea. The understanding that certain areas of the Chukchi Sea are of special importance is reflected in recent decisions, such as the Secretary's 25 Statute mile deferral in the 2007-2012 Five-Year Program, the corridor's expansion around Barrow in the 2012-2017 Five-Year Program, as well as the selection of Alternative IV (which included a corridor deferral) from the 2007 FEIS and the 2011 Final SEIS for the decision on Lease Sale 193. The current Final Second SEIS contains special consideration of coastal communities, the spring lead system, subsistence-harvest areas, migratory corridors, Ledyard Bay Critical Habitat Unit, Kasegaluk Lagoon, Hanna Shoal, avian breeding colonies such as Cape Lisburne and Cape Thompson, designated Essential Fish Habitat, caribou calving grounds and insect relief areas, special vegetative communities, marine mammal haulout areas, and many other spatial areas. BOEM's ESP is currently studying the core area around the Hanna Shoal and the greater adjacent area for information that will guide any future decisions on exploration and development.

Sharing BOEM's Science. BOEM shares scientific study findings in a number of ways, including technical reports, peer-reviewed journal articles, annual public conferences, periodic workshops, website dissemination, and occasional project-specific community meetings. BOEM also publishes a science and technology journal, *Ocean Science*, available online at http://www.boem.gov/ocean-science/. BOEM prepares environmental documents that include the findings of both BOEM scientific studies and relevant studies from other organizations. Agency information about environmental studies is on the web portal at http://www.boem.gov/akstudies.

Issue 2. Public Outreach

Summary of Comments

Various comments took issue with the public review and comment period provided for the Draft Second SEIS.

There were several requests to extend the commenting deadline beyond the 45 days from publication of the notice of availability in the *Federal Register* to provide more time for community input and to complete additional scientific studies. These comments assert that 45 days is an inadequate time to

review a nearly 700-page technical document, plus appendices and reference materials, especially during holiday periods. Additional time would give the public time to more thoroughly understand the important and complex interrelationships in the Chukchi Sea's natural environment.

Comments also stated that public meetings lose meaning and effectiveness if participants aren't familiar with the particular documents under discussion. "We can't help improve the document if we don't know or understand what's inside it," BOEM heard at meetings. Some commenters also pointed out that it is impossible to inform the public and receive useful comments within the couple of hours of a public hearing.

Conversely, many other comments specifically asked that BOEM not extend the comment period and maintain its schedule.

Some comments expressed frustration about being obligated to comment on potential offshore drilling yet again. Most of these comments came from parties asserting Native communities' longstanding resistance to offshore oil and gas activities in the Arctic. "I have been going to these kind of meetings for the last 10 years," one meeting attendee explained, "and it seems like we are not getting anywhere."

Several comments asserted that BOEM's efforts to notify the public of its Draft Second SEIS or public meetings were inadequate and that, as a more general principle, communities have not been adequately informed as to how mitigation would take place. One comment stated that indigenous people throughout the Arctic have not been engaged fully, nor in a culturally appropriate manner.

Some comments suggested ways that BOEM can improve its outreach efforts, such as:

- Provide more notice ahead of time to get more people together and hear concerns.
- Plan a meeting at the schools and/or invite the younger generation to public meetings by sending e-mails or contacting the school principal.
- Provide more educational materials such as [the Draft Second SEIS] for use in the schools.
- Use Facebook to advertise agency activities.
- Host a round table discussion with the Coast Guard, BSEE, BLM, and the State of Alaska, such that communities do not need to repeat themselves.
- Provide communities with feedback on how BOEM considered their comments and what the agency's decisions were.

Finally, one comment requested that BOEM incorporate comments received on past Beaufort Sea OCS lease sales and select oral testimony from the Draft Second SEIS public meeting. This comment also requested that BOEM provide specific analysis of all these comments.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Information about BOEM's extensive outreach efforts during the SEIS process is in Chapter 6 of the Final Second SEIS. Additional responses are below.

Obligation to Seek Comments. Even when a community has objected to the prospect of OCS leasing, exploration, or development in the past, BOEM must carry out its responsibilities under NEPA and the OCSLA. BOEM must solicit and gather public input at each phase of the OCSLA process, and during preparation of every EIS.

Availability and Efforts to Notify. BOEM took deliberate steps to announce the availability of the Draft Second SEIS, to disseminate the Draft Second SEIS, to meet with interested parties, and to publicize the series of meetings scheduled specifically for this process. These efforts included the following:

- Publishing a Notice of Intent in the *Federal Register* on June 20, 2014, to Prepare the SEIS (79-FR-35378), as well as a Notice of Availability of a Second Draft on November 7, 2014 (79 *FR* 70554).
- Updating BOEM's website and providing a link to the Draft Second SEIS (link added on October 31, 2014).
- Mailing hard copies of the Draft Second SEIS to Tribal and local governments, local libraries, and other parties who expressed interest in BOEM NEPA documents in the past (Mailed on October 31, 2014).
- Scheduling a series of meetings with both Tribal and local governments in five potentially affected villages – Kotzebue, Point Hope, Point Lay, Wainwright, and Barrow – as well as in Fairbanks and Anchorage.
- Placing large newspaper ads to appear in two editions each of the *Arctic Sounder*, *Fairbanks News-Miner*, and *Alaska Dispatch News*.
- Running public service messages on the two public radio stations serving the North Slope—KBRW in Barrow and KOTZ in Kotzebue—and, providing the same messages to commercial radio station KBYR (broadcast in several communities of the North Slope).
- Providing our community advisories to news media assignment editors from at least two dozen radio and television stations and newspapers in the North Slope, Northwest, Anchorage, Fairbanks and Southeast (including the Alaska Public Radio Network), and thereby encouraging their possible follow-up with additional announcements or stories.
- Using social media, such as BOEM's Facebook page, to inform the public of the agency's efforts.

BOEM Alaska OCS Region sends notification of all new NEPA documents to all persons who have signed up for its distribution list. All interested parties are encouraged to join BOEM's distribution list and specify whether they would prefer regular mail or e-mail notification. Individuals may sign up for the distribution list by calling BOEM Alaska OCS Region directly at (907) 334-5200.

BOEM also produces transcripts of public hearings held for environmental reviews. The public hearing transcripts on the Draft Second SEIS are included within an appendix to the Final Second SEIS. BOEM posts public hearing transcripts on its Alaska Region website at http://www.boem.gov/AK-Liaison.

Extended Time to Comment. CEQ regulations require BOEM to provide a minimum 45-day public comment period on the Draft Second SEIS. BOEM has met this requirement. In addition to accepting written comment, BOEM accepted comment at six public meetings held around Alaska, including major population centers and communities near the Proposed Action area. Considering the previous opportunities for public input on Lease Sale 193, the narrow scope of the remand dictated by the decision of the U.S. Court of Appeals for the Ninth Circuit, the interest in promptly resolving uncertainty regarding the leases issued in 2008, and the requirements of the CEQ regulations, BOEM

declined to extend the 45-day comment period, which provided adequate time for receipt of comments on the document.

Community Calendars. BOEM strives to work with community and tribal leaders when setting up meetings in Alaska communities. Specifically, BOEM Alaska OCS Region's Tribal and Community Liaison works closely with the Alaska communities on the timing of these meetings. BOEM recognizes many communities engage in a subsistence way of life and that the government must be flexible when subsistence activities are ongoing in the community. BOEM also recognizes additional considerations to include holidays, elections, and cultural, community and family activities, and does its best to avoid scheduling conflicts with these important events.

Improving our Process. While the Bureau feels these combined efforts were more than adequate to satisfy its NEPA obligations, the agency remains committed to improving its public outreach efforts. In coming months, BOEM's Alaska OCS Region Community Liaison will update the current operational plan to improve public communication with potentially affected communities.

Several ideas already under active consideration include:

- Increase routine communications with the Tribes and communities, providing more frequent updates of ongoing projects, programs, studies, and other information of interest from BOEM.
- Improve and increase use of the 'mukluk telegraph' method of using routine e-mails to discuss cultural, scientific and educational areas of interest.
- Increase community outreach to schools, including Ilisagvik College and the Chukchi Campus, and bring BOEM scientists into school classrooms on the North Slope.
- Organize and develop a 'BOEM traveling workshop' to share information, methods of work and activities associated with the Alaska OCS, permitting processes, studies, etc., to provide opportunities for increased awareness and understanding.
- Work with local media outlets, especially KOTZ and KRBW radio stations, to affirm recent 'good practices' and to inculcate these outlets into BOEM's ongoing relationships that benefit Tribes and communities.
- Strengthen BOEM's relationships with the Tribes, communities, cultural organizations, ANCSA Corporations, and others as it relates to Alaska OCS activities.
- Continue to explore partnerships, stewardship, and information sharing opportunities to improve communications on all levels and in all practical ways.
- Follow-up on previously issued informal invitations to visit BOEM Alaska Region when traveling to or through Anchorage.

Feedback Regarding the Decision. BOEM Alaska Region is considering when to return to the communities to meet with community leaders, tribal leaders, and residents to explain how comments were incorporated in the Final Second SEIS, and to explain the decision of the Secretary of the Interior. The Secretary of the Interior is expected to make her decision in March 2015. BOEM staff will contact key community and tribal leaders to discuss their interest in BOEM returning to the communities for meetings. Clearly, one of the challenges will be to work to avoid brushing up against the spring hunting season.

Incorporation of transcripts. Transcripts of public meetings held for the Draft Second SEIS are provided in an appendix to the Final Second SEIS. Also provided are substantive comments received through the http://www.regulations.gov commenting portal. Transcripts and/or comments concerning other, past BOEM actions are outside the scope of this analysis and are not incorporated into the Final Second SEIS. Comments received on the Draft Second SEIS provide the basis of many revisions to the final document.

Issue 3. Preferred Alternative

Summary of Comments

Most comments on the Draft Second SEIS indicated a preference on which lease sale alternative should be selected.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Under NEPA, an agency's preferred alternative frequently takes into account factors beyond the environmental effects analysis contained within the document itself. Departmental regulations at 43 C.F.R. 46.420(d), which implement CEQ regulations at 40 C.F.R. 1502.14(e), describe the agency's preferred alternative as "the alternative which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors. The concept of 'agency's preferred alternative' is different from the 'environmentally preferable alternative,' although in some cases one alternative may be both."

BOEM has determined that Alternative IV best fulfills its statutory mission and responsibilities, given all relevant economic, environmental, and technical factors. Section 2.1.1 has been revised to state BOEM's preferred alternative for the Final Second SEIS.

No decision on drilling will be made during this SEIS process. The Record of Decision to vacate, modify, or affirm the lease sale will be issued by the Secretary of the Interior after due consideration.

Comments that express general opinions or recommend specific decisions that must be made by the Secretary of the Interior, will be incorporated into the administrative record and available to the decision maker during the deliberative process for Lease Sale 193. BOEM will not provide specific responses to these comments.

Issue 4. Compliance with NEPA

Summary of Comments

Pursuant to its responsibilities under NEPA and Section 309 of the Clean Air Act, the EPA assigned the Draft Second SEIS a rating of Category 1, meaning "EPA believes the draft EIS adequately sets forth the environmental impact(s)," and that "no further analysis of data collection is necessary," although the reviewer may suggest the addition of clarifying language or information. The EPA reviewer also suggested that BOEM include an Executive Summary and an Impacts Summary table within the Final Second SEIS. Some public comments also echoed the EPA's positive adequacy rating.

Conversely, BOEM received many comments that assert the Draft Second SEIS does not comply with NEPA, and some expressed these additional concerns:

- It improperly assumes the existence of leases.

- It is a "post-decisional approach that violates NEPA by depriving the agency and the public from a meaningful opportunity to evaluate the possibility of precluding leasing in all or part of the Leased Area."
- Its resulting analysis undermines one of the NEPA's central tenants – the effects of a decision must be analyzed before making the decision.
- It fails to examine an adequate range of alternatives, although BOEM acknowledges that Alternatives I and IV are "effectively the same" for the purpose of environmental analysis.
- Despite new information and analysis, it fails to assess whether leases should have different stipulations and mitigation measures to better mitigate the larger potential effects.

Some comments asserted that the Draft Second SEIS fails to examine a reasonable range of alternatives, and point to BOEM's acknowledges that Alternatives I and IV are "effectively the same" for the purpose of environmental analysis. Some specific suggestions or criticisms included:

- The three action alternatives fail to provide the Secretary with a meaningful range of choices about which areas of the Planning Area to offer for oil and gas leases.
- New information about the Chukchi Sea ecosystem, oil spill preparedness and companies' abilities to operate in Arctic conditions should inform the range of alternatives. BOEM should use this information to develop additional alternatives beyond the three action alternatives considered in the 2007 EIS and 2011 SEIS.
- BOEM should analyze additional spatial exclusions and additional lease stipulations or other mitigations.
- BOEM should consider a range of alternatives for Hanna Shoal and other areas of the Chukchi Sea that contain important resources. BOEM's reasons for declining to develop a Hanna Shoal alternative are not justified.
- Considering different alternatives might result in altering the size of the 4.3 Bbbl Scenario.
- BOEM should consider measures to encourage non-fossil fuel energy sources.

Several comments also indicated that the Draft Second SEIS:

- Was rushed and hastily prepared.
- The shortened comment period was to allow Shell Oil to proceed with their proposed 2015 drilling plan in the Chukchi Sea.
- Suggested there is no evidence on the record that the courts that mandated this supplement also mandated an expedited process and review period.
- One commenter observed that BOEM's impact analyses are qualitative at best and the agency relies solely on its analysts' "professional judgment," but does not provide any information on who the analysts are, nor their professional background, experience, expertise, or position.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Executive Summary and Impacts Summary Table. An Executive Summary is included in the Final Second SEIS. As suggested, the Executive Summary features an Impacts Summary table.

Existence of leases. Under NEPA, an EIS is only required to analyze development that is reasonably foreseeable. (See 40 C.F.R. §1508.7) When the exact scope and extent of oil and gas drilling to be conducted as a result of a lease sale is unknown, BOEM must engage in reasonable forecasting and speculation. It is well accepted that agencies must use information available to them when determining what future development is reasonably foreseeable.

Lease Sale 193, which was held in 2008, defined the boundaries of the area within which on-lease exploration, development, and production activities (e.g., placement of any exploration-drilling structures or any permanent production platforms in the deferred area) could potentially occur. These leases have not been vacated by any Court or the Secretary. It would not be reasonable to consider the potential effects from oil and gas activity on areas where no leases were issued because no matter what decision the Secretary of the Interior makes with respect to Lease Sale 193, no additional areas will be offered for lease; without leases, exploration, development, and production cannot occur.

Using new information pertaining to the areas of the OCS that are subject to exploration, development and production as a result of Lease Sale 193 provides for more precise resource estimation, which leads to a more realistic analysis of potential environmental effects. Using this information ensures that the analysis is based upon fact, as opposed to a hypothetical scenario that, by virtue of the lease sale having already occurred, simply cannot come to pass no matter what decision the Secretary ultimately makes.

Using this new information does not unlawfully constrain the Secretary's decision-making authority on remand, nor does it improperly influence the decision-making process. The U.S. Court of Appeals for the Ninth Circuit remanded the decision on the basis that the Secretary must consider the full range of oil and gas production that could reasonably occur as a result of Lease Sale 193, assuming a commercial discovery is made and production occurs. Oil and gas production cannot reasonably occur from areas that are not and cannot be leased as a result of the lease sale. By considering the oil and gas potential that actually exists in the areas of the OCS underlying the leases issued as a result of Lease Sale 193, the Secretary considers only production that can reasonably occur. By using this more precise information to develop the revised Scenario, the Secretary is well positioned to make the decision whether, where, and under what conditions to affirm, modify, or vacate oil and gas leases in the Chukchi Sea.

Nor does consideration of this new information result in a lower-volume exploration and development scenario. An important consideration in development of the Scenario is the availability of capital and equipment necessary to explore for and extract hydrocarbons from the Arctic OCS, as well as the potential terms of leases, which are capped by statute. A greater number of leases issued does not equate to a greater amount of exploration and development. As explained in more detail in Chapter 2, Section 2.3 and Appendix B, it is not reasonable to assume that more than two prospects will be developed as a result of the Lease Sale 193 leases. Given finite time (i.e., lease terms, seasonal ice, etc.) and resources (i.e., money, Arctic-class drilling rigs, etc.), lessees will necessarily prioritize their efforts on the most promising areas. The most promising prospects in the Chukchi Sea Planning Area were leased in 2008 and are already considered in this analysis. Consideration of other, less-promising areas of the Chukchi Sea OCS would therefore fail to increase reasonably foreseeable production from the lease sale. If anything, was the analysis to assume that lessees focused on less promising areas, estimated production would more likely be reduced than enhanced.

Commenter[s] who state that in the absence of post-sale information, BOEM would have tied its Scenario to information about the undiscovered economically recoverable resource (UERR) potential

of the entire leases area of 11.5 Bbbl misunderstand what is meant by the term "UERR." As explained in Chapter 2, Section 2.3, the UERR represents the amount of oil and gas in an area that could be economical to explore, develop, and produce under a given set of assumptions. UERR is not a realistic estimation of how much oil and gas could be produced as the result of a single lease sale because the amount is calculated without regard to important real-world constraints on drilling, such as limited availability of infrastructure, limited drilling seasons and financial factors such as competing global opportunity for industry investment.

Criticism that BOEM's oil spill analysis is improperly skewed by virtue of considering platform spills only from areas actually leased is also misplaced. By considering areas where on-lease exploration, development, and production can actually occur, BOEM is in fact providing a more realistic assessment of oil spill trajectories in the event of a spill.

Range of Alternatives. Several commenters stated that the range of alternatives in the NEPA analysis is not adequate. A full discussion of the range of alternatives originally considered for Lease Sale 193, including those alternatives considered but not carried forward for analysis, was provided in Section II.B.2 of the 2007 EIS (USDOI, MMS, 2007). In preparing the Second SEIS, BOEM considered whether the court's remand, information developed since the 2011 SEIS, or information provided through public comment merits development and analysis of additional alternatives, and determined that none do. BOEM believes that the current alternatives offer an effective range of options that meet the purpose and need of the proposal, to offer for lease areas of the Chukchi Sea OCS that might contain economically recoverable oil and gas resources, and the goals and objectives of the OCSLA, to lease, explore and develop in an environmentally safe manner.

The Alternatives considered in the 2007 EIS, 2011 SEIS and this Second SEIS reflect consideration of various coastal deferral corridors (Alternatives I, III and IV). The deferral corridors were developed to explore the potential mitigative effects of limiting leases to areas various distances from shore, which was anticipated to reduce potential impacts to a range of resources, including walruses, fish, waterfowl, belugas, polar bears, seals, and subsistence-harvest activities. Many of the potential deferral areas identified during scoping were based on protecting a single resource, such as walrus, bowhead whale, or critical habitat for Steller's eiders. Information from the scoping meetings was coupled with information – largely derived from consultation with USFWS and NMFS – concerning threatened and endangered species. These areas were mapped and incorporated into Alternative III and Alternative IV. Combining the multiple suggested alternatives into broader deferral areas resulted in a more comprehensive ecosystem-level approach to the analysis and recognized the interconnectedness of the resources of the Chukchi Sea. This range of alternatives was not directly challenged in prior litigation; to the extent that certain parties argued that lack of information led to an insufficient range of alternatives, that argument was denied and BOEM's decision upheld.

The only fault concerning BOEM's 2007 and 2011 NEPA analyses identified in the U.S. Court of Appeals for the Ninth Circuit's recent opinion was a failure "to base its analysis on the full range of likely production if oil production were to occur." Neither the Court of Appeals' remand nor the CEQ regulations pertaining to supplemental EISs require BOEM to formulate new alternatives. The nature of the activities comprising the revised Exploration and Development Scenario are the same as those analyzed in the 2007 FEIS and 2011 SEIS; only the scale and duration of activities have changed. Thus, the Court's requirement that BOEM examine the full range of production, if production were to occur, does not require consideration of additional alternatives.

No new information has been obtained since the 2007 FEIS or 2011 SEIS that would require the development of new alternatives. Studies released after publication of the 2007 FEIS, such as those tracking the migrations of bowhead whales, for example, confirm the understanding that influenced the existing alternatives. Public comments to the Draft Second SEIS requesting consideration of additional alternatives focused mostly on Hanna Shoal. As explained in more detail in Section 2.1.2

of the Second SEIS, there are multiple reasons why new information pertaining to the importance of Hanna Shoal to marine mammals does not require development of a new alternative on remand, including the facts that only a small and peripheral portion of the shoal (however it is delineated) contains leases, and statutory protections are in place to ensure that activities will not be permitted if impacts to the resources that most heavily depend on the shoal – marine mammals – would be more than negligible. For example, the marine mammal species most frequently cited in comments requesting an additional deferral alternative – walrus –benefit from enhanced protections under USFWS's current Incidental Take Rule. In other words, existing processes and regulatory protections sufficiently insulate marine mammals from the types of harm cited in public comments. Alternatives III and IV have the added benefit of being designed to mitigate impacts to resources beyond marine mammals, such as subsistence-harvest patterns and environmental justice.

Based upon all of the foregoing considerations, BOEM determined, prior to publishing the Draft Second SEIS, that additional alternatives are not required to foster informed decision-making and informed public participation. BOEM has considered the public comments urging consideration of one or more alternatives designed to protect the resources in and around Hanna Shoal or other resource areas, and has determined that it remains unnecessary to analyze any of the suggested areas as stand-alone alternatives. Resource areas identified by commenters, including Hanna Shoal and Herald Shoal, are analyzed in detail commensurate the available scientific and traditional knowledge, as well as the area's relevance to this lease sale decision. For example, BOEM added additional detail in this Final Second SEIS pertaining to the significance of Hanna Shoal as well as potential impacts to the specific species for which Hanna Shoal is most important. Chapter 3 now includes a more detailed discussion of the various boundaries of Hanna Shoal, and what characteristics each delineation of the shoal seeks to include. Where relevant, the analysis in Chapter 4 explains how Scenario activities and oil spills in or around Hanna Shoal could affect resources using the area. Through taking this approach in its analysis, BOEM ensures that sufficient information is presented in the Second SEIS to inform a decision whether the lease sale should be modified to include any additional mitigation strategies – up to and including vacating certain leases – to protect a given area's physical, biological, and social resources. Adding additional spatial alternatives at the lease sale phase would only result in repetitive analysis.

In light of the limited scope of the remand, the detail provided within the analysis about potentially important resource areas, and the various tailored mitigation measures proposed to reduce potential impacts, BOEM determined that the SEIS would be most meaningfully informative by keeping the alternatives consistent with the prior EISs. Reformulation or addition of alternatives would fail to strengthen the analysis and could only unnecessarily complicate the relatively straightforward task set out under the U.S. Court of Appeals for the Ninth Circuit's remand order. The range of alternatives analyzed and upheld as legally sufficient in the 2007 FEIS and 2011 SEIS therefore remains the same.

Difference between the action alternatives. After publication of the 2007 EIS, the Secretary chose to implement Alternative IV, which had a smaller deferral corridor than Alternative III, but a larger deferral corridor than Alternative I. Because no leases were issued in the Alternative IV deferral corridor, and no new leases will be offered for sale through the remand, selection of Alternative I (which would have allowed leasing in the Alternative IV deferral corridor) effectively could not result in different impacts than Alternative IV. Thus, the analysis of the original set of four alternatives is condensed to three for the Second SEIS: two action alternatives (Alternatives III and I/IV) and the No Action Alternative (Alternative II).

NEPA does not require consideration of a set number of alternatives; instead, the range of alternatives is based upon a rule of reason. While innumerable alternatives could be created, here, two action alternatives, each carefully tailored to provide an extra amount of protection for a variety of resources, is sufficient. Considering the multi-staged nature of the offshore development approval process established by Congress through OCSLA, and the continually growing body of knowledge

regarding Chukchi Sea environs, it is often most appropriate for BOEM to consider additional mitigation measures like time and area restrictions upon proposal of a specific activity, e.g., an exploration plan.

Just as various portions of the SEIS highlight potential differences in effects of oil and gas development as between the action alternatives, other portions of the SEIS acknowledge where potential effects of oil and gas development and production would be similar under each action alternative. Such conclusions are attributable to the inherent uncertainty at the lease sale stage regarding the exact location of future development and production activities; while the Exploration and Development Scenario assumes production of 4.3 bbbl of oil and 2.2 tcf natural gas, it is impossible to know, until specific exploration plans are submitted and approved and commercial discoveries made, where exactly any exploration and development activities and their resultant effects will occur. Notable differences in potential impacts between Alternatives I/IV and III do exist in terms of possible development and production locations. For example, selecting Alternative III, which incorporates a larger deferral area could increase the minimum potential distance between a platform and the shoreline, thereby reducing the potential for conflict with near-shore species and cultural activities, but also increasing the length of the gas pipeline and its associated effects. These differences are noted in relevant portions of Chapter 4 of the SEIS analysis. The types of effects that could occur during a VLOS are also similar between alternatives due to the unknown location of the hypothetical oil spill and the large areas that would be impacted regardless of the location of the spill's source.

SEIS Timeline. BOEM understands the importance for all parties involved that BOEM thoroughly perform the analysis on remand and expeditiously reach a decision regarding the status of the existing leases issued as a result of Lease Sale 193. BOEM is working to issue a new Record of Decision in a timely manner, but is not cutting corners in the regulatory compliance process, including compliance with NEPA. BOEM has taken a thorough and diligent approach to NEPA compliance for Lease Sale 193, as well as other required regulatory processes such as compliance with the Endangered Species Act. BOEM staff worked extended hours and brought in additional support from across the U.S. Department of Interior (USDOI) to complete the Second SEIS promptly and thoroughly.

Agency analysts. BOEM uses a combination of qualitative and quantitative techniques to analyze potential effects of the Proposed Action. These analyses use the best available science from a wide variety of studies and are fully referenced. As noted in Section 6.5 Authors, Reviewers, and Supporting Staff, BOEM analysts are a multidisciplinary team and have a wide variety of expertise in scientific, economic, and sociocultural disciplines relevant to conducting an analysis of the Proposed Action. They understand both the unique environment of Arctic Alaska and the potential for a given study to disrupt behavior being studied. Consequently, analysts considered the strengths and weaknesses of each study before determining whether its results warranted incorporation into the SEIS analysis. BOEM has many subject matter experts preparing the SEIS, as well as over 30 years of experience in Alaska in managing OCS resources that have been subject to leasing, exploration, and development and production. The Federal Office of Personnel Management has background and information on the classification and qualifications of government employees at http://www.opm.gov/policy-data-oversight/classification-qualifications/.

Other energy sources. Consideration of non-fossil fuel energy sources does not meet the Purpose and Need of this SEIS.

Mitigation. In response to public comments that BOEM sometimes failed to (1) clearly identify mitigation measures; (2) state whether identified mitigation measures were assumed to be implemented for purposes of determining impacts; and (3) assess the effectiveness of identified mitigation measures, BOEM has revised the Second SEIS to more clearly address these issues.

Specifically, as noted in Section 2.2.1, discussion of potential mitigation measures, beyond those already required through lease stipulations or applicable law, has been included throughout the Second SEIS, in the resource section for which the mitigation could reduce impacts.

Issue 5. SEIS Framework and Assumptions

Summary of Comments

Several comments challenged the Draft Second SEIS framework or requested clarification of the SEIS assumptions and/or scope. These comments included:

- During public meetings, several people asserted that the U.S. government lacks authority over Iñupiat lands, waters, and resources; that the Iñupiat people have sole ownership of and authority over the Chukchi Sea. "This is our land, our ocean, our property," BOEM heard. "We own the ocean. It is ours. It was provided to us and God has given it to us, and God is the one that has provided it with all its food in our life and culture…."
- Approves "tiering" from other analyses, but also requests explanations of BOEM's general approach, and suggests BOEM list documents that the agency intends to tier to or incorporate by reference.
- Commends BOEM's incorporation of previous studies and analyses, but this commenter recommends a clearer articulation of whether the agency intends to restate its previous analyses or simply summarize earlier data and conclusions to support a focused discussion on new information.
- Requests details about the significance of new studies and the manner in which the scientific research cited supports BOEM's conclusions.
- Notes that as many sections in the Draft SEIS rely heavily on information in previous documents, i.e., previous BOEM NEPA documents and previous Section 7 consultation documents. More of this information should be brought forward in the Final Second SEIS.
- Requests additional discussion and a clearer distinction between *assumed* and *proposed* mitigation measures.
- Calls for additional or otherwise improved discussions of mitigation measures and their influence on the analysis. More specifically, BOEM was encouraged to include a more robust explanation of:
  - What measures are already in place;
  - The effectiveness of these measures in light of BOEM's analysis of significant new circumstances since the 2011 SEIS; and,
  - Why the agency concludes that additional mitigation is unnecessary.
- Requests that BOEM square the discussion of mitigation within various impacts analysis sections with the general statement in Section 2 that BOEM did not identify any additional mitigation measures.
- Criticizes the SEIS for being inconsistent with the "targeted leasing" strategy adopted for Alaska OCS lease sales starting with the Five Year Outer Continental Shelf Oil and Gas Leasing Program for 2012 to 2017.
- Asks that the SEIS analyze potential fracking activities that would occur with the development of offshore leases.
- One comment points out that the statement in Section III.A.1.e(4) of the 2007 FEIS that "only a few earthquakes have occurred in historic times in the planning area" may be inaccurate because operating coastal seismic stations are reportedly only able to register

7% of all seismic events occurring in the region (see notes under Issue 4 on seismic events).

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Ownership of OCS. The issue of U.S. governmental authority over Iñupiat lands, waters, and resources is beyond the scope of analysis in the SEIS. As a jurisdictional matter, the Federal Government holds jurisdiction on Alaska's Outer Continental Shelf.

Tiering. BOEM's approach with respect to these issues is explained in Section 1.1 and in the front matter to Chapters 3 and 4. Where practical, BOEM summarizes previously described data and conclusions to support a more focused discussion in this Final Second SEIS.

New information. New information considered for this analysis is specifically identified in Chapter 3 and Literature Cited, and incorporated into the impacts analysis of Chapters 4 and 5.

Use of studies. Scientific studies used to support the analysis and conclusions of the SEIS are cited throughout the document. Additional explanation of how each study supports a given piece of analysis or conclusion is beyond the scope of this document.

Mitigation. BOEM has enhanced its discussion of mitigation measures in the Final Second SEIS to incorporate potential mitigation measures suggested by comments, to clarify which mitigation measures would be required versus proposed, and to clarify how potential environmental impacts would be reduced with the application of required as well as proposed mitigation measures. The referenced statement in Chapter 2 of the Draft Second SEIS was incorrect and has been revised.

Section 2.2 inadvertently stated that BOEM did not identify any additional mitigation measures. Stated accurately, BOEM did not identify any additional program-wide stipulations because none were determined to be necessary. However, BOEM did include discussion throughout Chapter 4 of potential mitigation measures, beyond those already required through lease stipulations or applicable law, in the resource section for which the mitigation could reduce impacts.

Hydraulic Fracturing. Hydraulic fracturing is not part of the Scenario and is not a reasonably foreseeable consequence of Lease Sale 193. The vast majority of hydrocarbon developments that use hydraulic fracturing are in unconventional reservoirs such as shales, tight formations and coal beds. These types of reservoirs would not be economic to produce in the Chukchi Sea. The Chukchi Sea reservoirs BOEM evaluated are conventional reservoirs that will not have a need for hydraulic fracturing and will rely on primary and secondary (gas and/or water injection) recovery for production.

Targeted Leasing. BOEM adopted the "targeted leasing" strategy for Alaska OCS lease sales starting with the Five Year Outer Continental Shelf Oil and Gas Leasing Program for 2012 to 2017. This strategy was different than area-wide leasing employed in previous Alaska OCS lease sales, including Sale 193 which was held in 2008. Targeted leasing starts with information received in response to the lease sale's Call for Information and Nominations and is further refined through the Area Identification and initial scoping for the environmental impact statement. As a practical matter, since the lease sale has already been held, the strategy cannot be applied retroactively. However, as

explained in Section 2.1.2, Alternatives Considered But Not Carried Forward for Further Analysis, BOEM did examine input regarding potential areas to be excluded from leasing received in response to the Call for the proposed Chukchi Sea Lease Sale 237, which was the first application of the targeted leasing strategy.

Seismic events. Seismic activity and tsunami predictions are actually very low. The notion that only 7% of seismic events in the Chukchi Sea area are detectable is attributed to Astakhov et al. (2014) "Lithochemical evidence of recent geological activity in the Chukchi Sea," which itself refers to Avetisov, G. P. (1996) "Seismically active zones of the Arctic." Astakhov et al. misrepresented Avetisov, who in fact referenced Lazareva (1977) "Seismic observations in polar areas." The estimate of 7% refers to a time prior to 1964 when only one seismometer was operating in the area. Avetisov estimates that reliable detection in the marginal areas of Alaska is now at magnitude 3.5-3.7. This is likely to be a conservative estimate because it does not include all stations deployed by the University of Alaska.

The authors of the comment cite the 2005 "City of Barrow Local All Hazard Mitigation Plan" when they claim the risk of a tsunami is present, but with unknown probability. The authors appear to have misread the mitigation plan. The table on page 10 of the plan states that the risk of tsunami and Seiche is not present. On page 29 of the plan, Paul Whitmore of the Alaska Tsunami Warning Center is quoted to estimate the risk of a tsunami to be "very low," based on an absence of historical or evidence [presumably geological or geomorphological] of previous occurrences, in addition to the low seismogenic potential of the area.

Issue 6. Exploration and Development Scenario

Summary of Comments

Several comments question aspects of the Exploration and Development Scenario (the Scenario) underpinning the Draft Second SEIS's environmental effects analysis.

Resource estimates too high. One comment states that sufficient data is not yet available to make realistic estimates of Chukchi Sea resources. The estimates would require further seismic acquisition, competent interpretation of data, many exploration wells and follow-up appraisal wells. This comment adds that existing available information suggests that Chukchi Sea plays look exceptionally weak in several regards, and BOEM should conduct additional assessments before entering these areas.

Production estimate too low. Several comments state that the Scenario underestimates potential environmental impacts by assuming too low of a production estimate. It was stated that BOEM should have considered impacts associated with the production of the full 15.4 Bbbl of technically recoverable oil or the 11.5 Bbbl of economically recoverable oil estimated to exist in the Chukchi Sea.

Number of Seismic Surveys. One comment questions whether 5 surveys in 25 years was a realistic estimate, and compared the Scenario of the Draft Second SEIS with Alternatives analyzed in NMFS' Draft Arctic EIS.

Number of production wells. The assumption on page 30 of "ninety subsea production wells on fifteen subsea templates" is inconsistent with other assumptions that "400 to 457 wells would be installed."

Alternative Technologies. There are other technologies that will have less of an environmental impact and that would not jeopardize animals like seismic testing does. There are also self-healing technologies where self-healing holes are drilled.

Economic Feasibility Questioned. One comment states that oil prices have fallen to about half that needed to make Arctic energy development feasible, and that all economic arguments lead to the ultimate failure of these leases ever producing any energy in an economically viable manner.

Unlikelihood of Success. One comment notes the Draft Second SEIS statement that the most likely outcome of approval of the program is drilling a bunch of dry holes and finding an insufficient amount of hydrocarbons to be economically viable. The comment adds that in light of the numerous cheaper alternatives to Chukchi Sea oil, it is "folly" to even pursue exploration.

Pipeline Corridor. One comment states that landfall of the pipeline and associated infrastructure in the vicinity of Barrow would pose a great deal more environmental risk than other coastal locations because of the sensitive and valuable wildlife habitat in the general vicinity of the "Barrow Triangle." This comment also suggests that BOEM require any onshore development to follow the terms outlined by BLM's 2012 IAP/EIS. Another comment questions sending the oil to TAPS, asserting that it is much simpler to run a pipeline down to the Bering Sea.

Natural gas estimate. One comment notes that the 2.2 Tcf of natural gas produced in the Scenario is less than the 2.75 Tcf of natural gas produced in the natural gas development and production scenario analyzed in the 2011 SEIS. This comment requests an explanation of why the estimate has been reduced, notwithstanding the increased oil production estimate, and/or why BOEM has changed its methodology to decouple natural gas production from oil production.

Decommissioning. One comment describes lessee's regulatory obligations with respect to decommissioning and suggests that decommissioning occur on an ongoing basis (i.e., as soon as individual structures are no longer needed), rather than only after termination of a lease.

Tankering. Several comments characterized the SEIS's lack of analysis of a tankering scenario to be unjustified. These comments pointed to oil and gas operations in other portions of the world that used tankering as means of transporting hydrocarbons to market.

Source of Comments

- Federal Government
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

The environmental effects analysis provided in Chapters 4 and 5 of the SEIS is based on the hypothetical oil and gas exploration, development, and production scenario (Scenario) provided in Section 2.3. The Scenario describes the types of oil and gas activities that could occur as result of the Proposed Action. The Scenario also estimates the timing, frequency and duration of these activities. In doing so, the Scenario establishes a basis for the analysis of potential direct, indirect, and cumulative impacts that could result from affirming Lease Sale 193.

Several additional points concerning the Scenario are important to understand:

- **The Scenario represents a high case of potential activities.** It is inaccurate to state or imply that the 4.3 Bbbl of oil production estimated by the Scenario would definitely occur as a result of affirming Lease Sale 193. Based on history and economic modeling conducted for this Final Second SEIS, the most likely result of affirming Lease Sale 193 is zero production. Even assuming that development and production does occur, 4.3 Bbbl of production still represents a high conditional estimate of potential activity. By assuming

such a high level of oil and gas activity, the SEIS ensures that potential environmental impacts are not underestimated.

- **All oil and gas activities would undergo additional environmental analysis and regulatory review.** All oil and gas activities described in the Scenario would receive further review, with the vast majority of activities requiring specific approval by both BOEM and BSEE. It is inaccurate to suggest that a decision concerning a lease sale would directly lead to oil spills, environmental harm, economic benefits, or any other impacts. Many years and many additional approval processes – each entailing environmental review and public commenting opportunities – would be required to bring the Scenario to fruition. The four-phase OCSLA process provides a continuing opportunity for making informed adjustments in developing offshore energy resources to ensure all activities are conducted in an environmentally sound manner. Oil and gas activities are not approved if they violate the law -- to include those laws designed to protect the environment.
- **The Scenario provides the Secretary with a broad view of potential impacts.** Pursuant to the judicial remand, the Scenario is intended to inform the Secretary of the Interior regarding potential environmental impacts from the full range of likely production, assuming that production occurs. The Scenario is not intended to precisely describe what *will* happen in each of the 77 years -- it is impossible to achieve that level of detail and accuracy. The Scenario is inherently a "big picture" exercise, and discrepancies between what the Scenario estimates and what actually happens in any particular year would not necessarily render the "big picture" inadequate.
- **The Scenario tells the most reasonable story of how development could occur.** The extent, timing, location, and method of any future exploration, development, and production activities cannot be predicted with any certainty at this time. For the purpose of providing a consistent basis for the analysis of environmental effects, the Scenario provides a single story of how lessees could develop and produce the assumed 4.3 Bbbl of oil and the associated 2.2 Tcf of natural gas. This story is the most reasonable story of how these activities could unfold, and is based on best professional judgment and considers current facts and circumstances. This story avoids undue speculation about potential future circumstances, such as use of unforeseen technologies, Congressional action, and other circumstances.

Resource assessments. BOEM develops oil and gas assessments based on the best available information using scientifically accepted techniques. BOEM possesses the vast majority of seismic data that has been collected in the Chukchi Sea, along with all of the well information collected from the 5 exploration wells drilled there as a result of two previous sales. Approximately 111,000 linear miles of marine seismic reflection data collected in the Chukchi Sea Planning Area provide an excellent framework for understanding the geology and geophysics. BOEM also possesses an extensive amount of seismic and well data from the Beaufort Sea and the entire North Slope onshore area, including the National Petroleum Reserve in Alaska, State of Alaska lands, and the Arctic National Wildlife Reserve.

While seismic data is useful to identify hydrocarbon prospects, only the drilling of a well can confirm the presence and extent of hydrocarbons. These facts explain the very large differences between the 95% mean and 5% undiscovered technically recoverable oil and gas resources in the Chukchi Sea Planning area in BOEM's 2011 Assessment. BOEM agrees that the only way to develop more accurate assessments is to drill more wells. With the information available, BOEM's oil and gas assessments are the best estimates possible. Operators are not permitted to drill wells on unleased parcels. This is why a lease sale is a necessary first step to acquire the additional data gained by drilling wells.

Production estimate too low. The 15.4 Bbbl cited in the comment is the Undiscovered Technically Recoverable Reserves BOEM calculated for all 11,472 blocks of the Chukchi Sea Planning Area. These are all the resources that could be produced by conventional means, regardless of the economic results. Production of some of these resources could only be done at a loss, something oil companies are understandably reluctant to do. Meanwhile, the 11.5 Bbbl cited in the comment is the Undiscovered Economically Recoverable Reserves BOEM calculated at an oil price of $110/bbl for all 11,472 blocks of the Chukchi Sea Planning Area. Only about 5,350 (46.6%) of those blocks were offered for lease in Lease Sale 193; only 487 (4.2%) of the total blocks were actually leased as a result of Lease Sale 193. A prelease sale resource analysis would exclude the resources in the deferral areas.

The purpose of this Second SEIS is to determine the possible impacts of affirming, modifying, or vacating existing leases. No additional leases can be issued as a result of this SEIS. No production from unleased areas can occur as a direct result of affirming the leases. The only resources that can be produced as a direct result of affirming the leases issued in Lease Sale 193 are the resources associated with those leases. In terms of context, it took the Gulf of Mexico OCS 65 lease sales from 1954 until 1999 to reach a cumulative production total of 11.4 Bbbl oil. It is unreasonable to suppose that the Chukchi Sea would have production of 11.5 Bbbl oil as a result of this single lease sale.

It is noted that the Final Second SEIS does include a cumulative case that assumes that a successful development on the current leases would generate interest in a new lease sale at some future date. Those new leases would be explored and developed as part of that process. A new EIS would be written for any proposed action for a future lease sale.

The lease contracts issued for Lease Sale 193 leases have primary terms of 10 years. If a lease is not held by production in paying quantities, downhole operations, inclusion in a unit, or a Suspension of Operations or Suspension of Production, it will expire at the end of its primary term. Currently the leases are held by Directed Suspensions because of litigation. To prepare for and launch a development operation on the scale anticipated in the Scenario would be an unprecedented venture in the OCS. The original reserves estimate for the largest prospect in the Gulf of Mexico OCS, Mars-Ursa, was 1.3 Bbbl. A development to produce 4.3 Bbbl would place such extraordinary demands on personnel and materiel that it would be difficult for a second operator to conduct operations. Furthermore, a second operator would likely want to take advantage of infrastructure such as platform hubs, pipelines, and onshore facilities created by the first operator. However, unless facilities and pipelines were designed to accommodate additional volumes, the second operator might have to wait until capacity becomes available. This delay might mean the second operator's leases expire before they can be developed. Interest in a future lease sale could be generated in part because leases on blocks leased in Lease Sale 193 may expire before they could be explored and/or developed.

To be clear, the 4.3 Bbbl oil volume and the cumulative 6.2 Bbbl are not minimum estimates. Table B-1 in Appendix B of the Draft SEIS shows the cumulative case conditional resources as calculated by Monte Carlo simulations of various possible cases. For Case #6, which was selected as the most reasonable, 5.7 Bbbl was the average cumulative volume and 5.5 Bbbl was the median cumulative volume.

Lease Sale 193 is the third lease sale to be held in the Chukchi Sea OCS. Five exploration wells have been drilled without the discovery of economic reserves. Based on current geologic interpretation, the chance of success for any Chukchi Sea OCS prospect is less than 20%. (Each prospect's chance of success is calculated based on its structure and other factors, so each prospect has a unique chance of success.) These facts mean that the most likely outcome is that no oil will be produced as a result of a single lease sale in a frontier area.

Resource estimates are based on applying statistical analyses to data from seismic and drilling programs and onshore development. It is statistically reasonable to suppose that large resources exist

in the Chukchi Sea OCS. Even with our best seismic data and interpretation, there is an element of chance as to whether an operator will drill in the right location to discover a large enough resource to warrant development. Operators know that the chance of success is low, but the potential payoff is high enough for them to risk billions of dollars for leases and exploration to get the opportunity to drill.

To provide a basis for an environmental analysis, it is necessary to assume that an economic discovery will be made as a result of Lease Sale 193. BOEM believes that there are conditions present that could result in the discovery of significant resources in the Chukchi Sea OCS, and, if enough exploration wells are drilled, a discovery could be made. The environmental impact analysis was performed on the basis of success.

Number of Seismic Surveys. The marine seismic surveys shown and evaluated in the Draft Second SEIS represent only those surveys that are permitted specifically due to Lease Sale 193. They are also specific to the Leased Area, not to the Arctic as a whole. Most seismic permitting is conducted to gather information prior to lease sale bidding activities. The post-sale seismic surveys conducted specifically due to this sale could involve 4D seismic or specific refinements to seismic collection to better define a discovered reservoir.

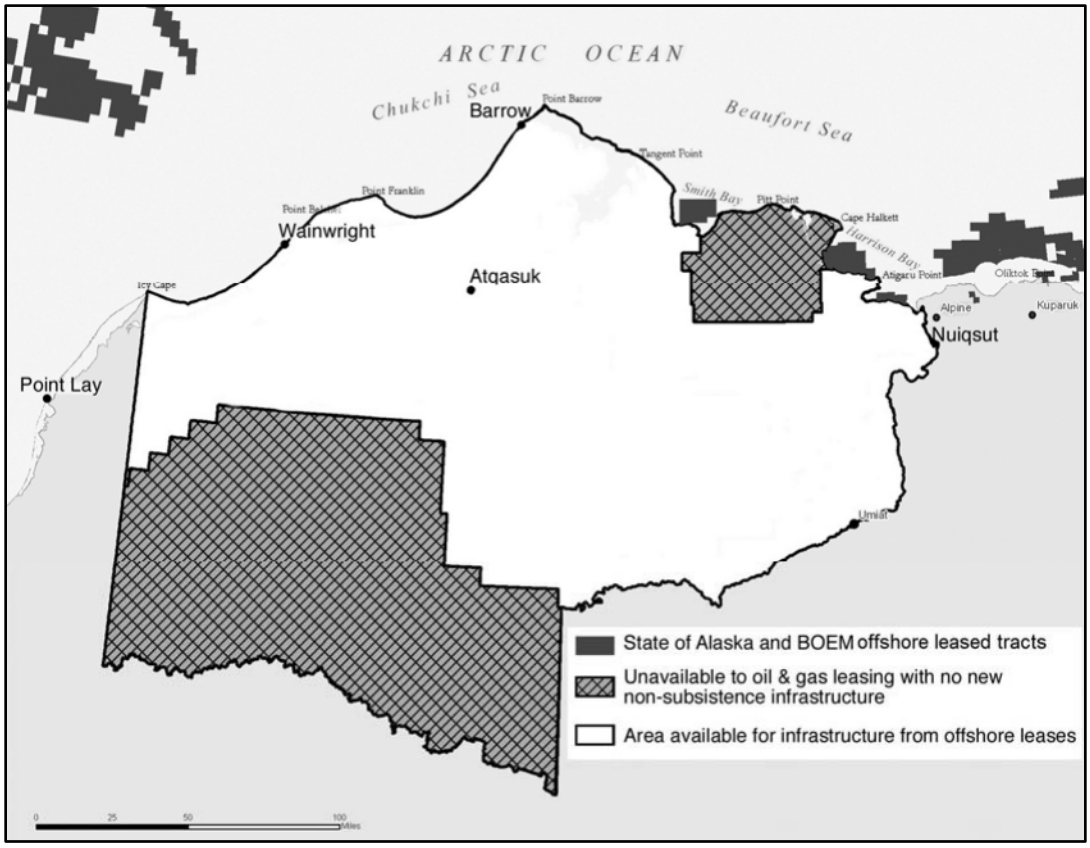
Number of production wells. The 457 total production wells shown on Table 2-4, page 34, of the Draft Second SEIS includes 90 subsea production wells not located directly on platforms and 367 production wells located directly on platforms.

Alternative Technologies. BOEM and BSEE regulations currently require operators to use the Best Available and Safest Technologies (BAST) program with latest proven technologies to ensure safety and protection of people, environment, and property. The BAST program requirement is contained in the 1978 OCSLA amendments and the Energy Policy Act of 2005. BOEM and BSEE regulators are involved with industry groups, university researchers and other NGOs to keep abreast of the latest technologies and safety methodologies. BSEE has a Technology Assessment Program that funds and supports research associated with all aspects of safety, including operational safety and pollution prevention.

There are no current proven technologies that effectively replace the types of seismic data collection analyzed in the SEIS. The seismic industry is working with government agencies to fund research developing new technologies to replace seismic operations and reduce the impacts of current seismic data collection methods. Current technology has been refined and improved significantly over the last few decades to reduce and focus the sound emitted by the operations. In addition, site-specific mitigation is required to reduce the potential for any significant impacts on marine mammals, fish, and the environment in general. When BOEM issues permits to conduct seismic surveying in the Chukchi Sea, the permits are conditions on the operator receiving and abiding by Incidental Take Authorizations (ITA) from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. In addition, BOEM only approves activities that are consistent with its latest Section 7 consultations on any listed species relative to the Endangered Species Act.

Economic feasibility. BOEM agrees that companies base decisions to purchase leases, explore, and develop on assumed long-term energy prices, which need to be relatively high for the offshore Arctic areas of Alaska. The economic factors influencing hydrocarbons and sustainable alternative energy sources are constantly changing, along with societal values placed on the use of all forms of energy. This Draft Second SEIS was based on the assumption that long-term oil prices would support the economics of development in the Chukchi Sea should extremely large oil resources be discovered. If either the resource or economic factors are missing, it is not likely that anything will be developed in the Chukchi Sea. A key objective of this SEIS is to address the environmental effects of Lease Sale 193, which assumes that development and production would occur.

Pipeline corridor. The shorebase and onshore pipeline location depends on the location of the discovery, an optimal building site where offshore and onshore pipelines could be readily connected, and an operator's ability to obtain necessary permits and approvals from the governing authorities and an arrangement to lease the land needed. These factors are beyond BOEM's authority, which is why BOEM does not attempt to specify a location for the shorebase or onshore pipeline, except that the shorebase would be constructed between Icy Cape and Barrow. This range of locations is based upon the location of the leases and a presumption that an operator would want to take the most direct route possible to get the oil and gas to shore. The pipeline/infrastructure corridor map (Fig. 1 from the 02/13 NPR-A IAP Record of Decision) is shown below. Pipelines and other infrastructure in support of offshore development are specifically allowed everywhere in the NPR-A, except the crosshatched areas. The K Stipulations do not specifically restrict pipelines/infrastructure. The stipulations do provide guidance to minimize environmental impacts. If a development actually occurs, there would be extensive NEPA evaluation conducted to evaluate the location of a shorebase and pipeline landfall. The environmental factors as listed would be evaluated and considered when those specific locations for facilities are defined.



Pipeline to Bering Sea. The economics of any oil and gas development project in the Chukchi Sea are difficult. The Scenario in the Draft Second SEIS constructs two offshore pipelines (one oil and one gas) of 190- to 210-miles running to the Alaska coast for landfall somewhere between Icy Cape and Barrow. Two (one oil and one gas) 300- to 320-mile onshore pipelines would be built across the NPR-A to the Prudhoe area and to connect to the Trans-Alaska Pipeline System (TAPS). The gas is used in the Prudhoe Bay area. The oil would go through TAPS and be loaded into tankers at its terminus in Valdez to go to current U.S. West Coast markets.

The Draft Second SEIS Scenario requires the development to be burdened with the construction of 490 to 530 miles of new pipelines and associated infrastructure. The development then uses the

existing TAPS and tankers. The existing TAPS tariff, along with the tankers tariff, are paid as they are used and do not require huge initial capital outlays by the project developers. Adding more oil into the existing TAPS would likely reduce the tariff in that facility, since tariffs are calculated on a per barrel basis.

The distance to construct a mostly offshore pipeline with the associated infrastructure (valves and pump stations) from the Chukchi Sea through the Bering Sea to a point somewhere on the Aleutians would be more than 1,200 miles. There would also be a need to build a tanker terminal facility. This burdens the development with billions of additional dollars in upfront costs and the tariff paid to help operate the pipeline/terminal facilities. There are currently no subsea pipelines this long anywhere in the world. Sub-sea pump stations and the placement of valves are likely to be something that regulators would oppose from both safety and environmental perspectives. Having landfalls along the western Alaska coast are also problematic due to various environmental issues/designations.

In general, it seems extremely unlikely that any developer would propose to construct a pipeline from the Chukchi Sea down the Bering Sea due to the economic, technical, environmental, and regulatory hurdles.

Natural gas volume. The 2011 scenario was based upon an idea current at the time that a gas pipeline would be built from the North Slope across Canada to connect Alaska natural gas directly with markets in Chicago, Illinois. Based on this assumption, prospects with high gas production (and even exclusively gas prospects) could be included in the analysis. Low natural gas prices caused the plan to be shelved in favor of a new plan to build a pipeline from the North Slope to Southcentral Alaska to transport natural gas to be converted into Liquified Natural Gas (LNG) for export. In addition to pipeline construction costs, capital costs for this project includes a plant to convert the gas to LNG and shipping facilities for LNG tankers. This change in the production Scenario also changed the expenses associated with gas production, altering the volume of gas that would be economic to produce. Only economic volumes are included in the Scenario.

The current Scenario is based on oil prospects; the only gas produced is that associated with oil production. After determining the most reasonable combination of anchor prospect and satellite prospect and calculating their respective oil volumes, BOEM geoscientists determined the Gas-Oil Ratios of onshore reservoirs to be analogous to the prospects and applied those ratios to calculate the gas reserves.

Decommissioning. BOEM developed the Draft Second SEIS using current regulations for dismantlement, removal, and remediation, including the current requirements for a lessee/operator. If these regulations are changed in the future, BOEM would need to conduct NEPA review to cover those revised regulations.

Tankering. BOEM specifically addresses the tankering strategies in Section 2.2.3. That section explains why this method is not feasible or reasonably foreseeable, and the section has been revised in the Final Second SEIS to augment BOEM's discussion of these issues.

Issue 7. Validity of Analysis and Conclusions

Summary of Comments

Many comments provided general opinions about the quality of analysis and the conclusions in the Draft Second SEIS. It was frequently stated that there is not enough information on biological resources and/or the physical environment (such as ocean currents or ice gouging) to support this NEPA review. Comments stressed the importance of listening to the views, Traditional knowledge, and local knowledge as necessary to ensure the Final Second SEIS is accurate and its analysis of Alternatives is complete. Some comments disputed specific conclusions, suggested revisions to particular impacts analysis sections, and/or requested clarification on specific issues.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Government
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

BOEM submits that this Final Second SEIS adequately analyzes the potential environmental effects associated with the Proposed Action and alternatives. There is sufficient analysis upon which to base this analysis and associated determinations of effect. In conducting its analysis, BOEM has considered the best available information, to include Traditional and local knowledge.

Based on public comments and internal BOEM review, several general improvements have been made to the document since the Draft Second SEIS was released. Most notably, BOEM:

- Updated discussions of individual species within resource categories;
- Revised and clarified discussions of IPFs and their potential effects on resources;
- Revised and clarified discussions of mitigation measures;
- Revised and clarified discussions of direct, indirect, and cumulative impacts;
- Increased consistency in the application of the relative scale used to categorized impacts (i.e., the 'Impacts Scale' that is described in section 4.2); and
- Revised conclusions to allow for a greater distinction between potential impacts from routine oil and gas activities and impacts from large oil spills.

Issue 8. Impacts Scale and Significance Thresholds

Summary of Comments

BOEM received several comments either praising or criticizing the Impacts Scale the agency used to categorize and describe environmental effects in the Draft Second SEIS. Comments critical of the Impacts Scale characterized the scale and its terminology as arbitrary, too subjective, and ill-defined. These comments suggested clearer, more quantitative thresholds.

Other suggestions include:

- Expand discussion and explanations for why the chosen impacts scale is appropriate for a programmatic lease sale analysis;
- Describe the beneficial impacts on the rigor of the agency’s review;
- Enhance the articulation and explanation associated with the impacts scale criteria and significance thresholds provided in Section 4.2;
- Provide a more concrete link between the Impacts Scale analysis and the conclusions; and,
- Articulate and clarify conclusions consistently throughout a given section.

Source of Comments

- Environmental Organizations
- Corporations and Industry Groups

- General Public

Response to Comments

The CEQ regulations implementing NEPA state that an EIS should discuss the significance of the direct and indirect effects of the proposed action and the alternatives (40 CFR 1502.16). Significance is evaluated by considering the context in which the action will occur and the intensity of the action (40 CFR 1508.27). In an early preliminary draft of the Second SEIS, BOEM tried to gauge potential environmental impacts using two separate grading systems, "levels of effect" and "significance thresholds." Each environmental resource was assigned a level of effect and a separate determination of either significance or insignificance. Within the "levels of effect," BOEM incorporated detailed descriptions of impacts.

BOEM analysts found this twofold methodology to be confusing, redundant, and cumbersome, which caused the analysts to apply the methodology inconsistently across the various resources they analyzed. Disapproving comments on the methodology also came from BOEM and cooperating and participating agency commenters during an early review of the preliminary draft document. After considering these comments, BOEM decided to simplify and standardize its approach for gauging impacts by revising the "Levels of Effects" into a simpler and more consistent "Impacts Scale," and to eliminate the separate list of "Significance Thresholds."

Significance Thresholds are more appropriate in the Environmental Assessment phase (40 CFR 1508.9) where the preparing agency assesses the potential for significant impacts in order to support a determination on whether an EIS is necessary. Here, BOEM is already preparing an EIS. In addition, this EIS supplements two previous EISs prepared for Lease Sale 193, both of which acknowledged the possibility of significant effects. Therefore, a primary purpose of Significance Thresholds – to determine whether a preparation of an EIS is necessary –has already been met with respect to Lease Sale 193. This is not to say that BOEM is eliminating the notion of significance from the Second SEIS. BOEM still identifies the point on the Impacts Scale that represents "significance." In this manner, BOEM maintains consistency with the prior Lease Sale 193 EISs, which also addressed significance. The difference is that for this Final Second SEIS, the concept of significance is not assessed using a separate scale, but is incorporated into the Impacts Scale.

The different four tiers of the Impacts Scale that BOEM ultimately adopted for the Draft Second SEIS and Final Second SEIS enables BOEM analysts to gauge the context and intensity of potential impacts with more precision, thus better informing the public and the decision maker as to the intensity of impacts all on one uniform scale. This is particularly important here, given the long duration and large scope of the Scenario. Analyzing the various types and levels of impacts that may result from the five different period of overlapping oil and gas activities that comprise the Scenario requires more nuance (as compared with the previous Significance Thresholds) and flexibility (as compared with the previous Levels of Effect) in the grading scale. It is BOEM's determination that the environmental analysis is better presented and described by the Impacts Scale. To the extent commenters wished to see BOEM define all adjectives used to describe each of the four tiers, BOEM disagrees that words like "little," "short-term," "localized," "long-lasting," "widespread," "clear change," etc., require definition. Additional context about what types of effects are considered to fall under each tier can be inferred from each individual resource section.

Issue 9. Climate Change

Summary of Comments

Various comments refer to global climate change and the challenges of a warming Arctic; with many generally referencing an already fragile, weakened Arctic from the warming climate and implying that Arctic animal populations are more sensitive to it. Other comments noted specific effects of

climate change already affecting Chukchi Sea coastal communities, including noticeable changes in sea ice conditions (highlighted by the Fall of 2014's relative lack of sea ice), dramatic coastal erosion, and a host of other changes.

"The environment is changing very fast," one public meeting attendee explained "…wind directions, current directions, the depth of ocean, the salinity of ocean, the air we breathe. You need to use new information and consider these things in your cumulative impacts analysis." It was also said that a lack of heavy ice due to global warming was negatively impacting subsistence. As one public meeting attendee explained, "It's hard to find that heavy solid ice in order to pull the whale. So I don't know about five more years. Maybe there will be no ice out there. Who knows?"

Some specific suggestions or criticisms concerning the Draft Second SEIS included:

- The Draft Second SEIS largely fails to meaningfully integrate climate change into the effects analysis.
- BOEM is legally obligated to follow draft guidance by CEQ released in December 2014.
- BOEM unlawfully has failed to assess the potential climate change effects of the combustion of oil and gas produced as a result of the lease sale.
- The Draft Second SEIS's direct, indirect, and cumulative analysis of the climate change impacts of emissions directly from oil and gas operations in the Chukchi Sea is insufficient.
- BOEM does not sufficiently analyze black carbon and it excludes or fails to adequately analyze impacts from methane releases.
- BOEM should disclose quantified emissions of GHG and black carbon in analyzing direct and indirect effects of the Proposed Action.
- The analysis is flawed because it analyzes the Proposed Action against a static baseline and ignores likely changes in the Arctic climate and environment. These documents should analyze effects to Arctic species over time while accounting for factors like diminished habitat, food resources, or population levels.
- BOEM is obligated to support U.S. foreign policy goals associated with climate change, and unproven resources in the Arctic must remain undeveloped to meet these and other international goals.
- BOEM should analyze contributions to climate change from increased natural gas and oil consumption resulting from the proposed action.
- Any additional sources of GHG emissions contribute to irreversible problems and costs associated with climate change.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- General Public

Response to Comments

BOEM shares concerns about climate change and the many unique challenges facing the Arctic. The Final Second SEIS addresses these concerns in several ways. Section 3.1.9 contains a robust discussion of climate change, its causes, and its potential influence on a dynamic Arctic environment. The resource-specific subsections of Chapter 3 address climate change and discuss its potential to influence relevant resources over time. The impacts analysis of Chapter 4 is set against the backdrop

of this dynamic environment. Climate change issues are also analyzed in detail in Chapter 5, where it explains how climate change (while not technically an "action" in the pure sense of cumulative impacts as defined by CEQ) "is an ongoing consideration is evaluating cumulative effects on environmental resources of the Arctic region, given its ongoing role in the changing Arctic ecosystem." As in Chapter 4, Chapter 5's impacts analysis has a strong and specific analysis of the effects of climate change as a critical factor in understanding potential impacts.

Judgments concerning the probability of future impacts should be informed, rather than based on speculation. The confident prediction of reasonably foreseeable impacts requires judgment based on information obtained from reliable sources. It is not presently possible for science to predict with confidence what precise (i.e., fine-scale) geographical changes to species distribution and habitat use may occur over long time scales and as the result of climate change. Therefore, characterizations in both Chapter 4 and 5 of how climate change will affect the environment and thus influence direct, indirect, and cumulative impacts of the Proposed Action over time are necessarily broad, so as to avoid undue speculative.

To offset the lack of ability to quantitatively analyze far future cumulative impacts with confidence and precision, permitting processes under the Endangered Species Act, the Marine Mammal Protection Act, and other Federal and state regulations, require regular consultation on potential impacts of activities for long-term projects to federally-protected species and habitats. Typically, reinitiation of consultation occurs prior to commencing a new phase of a long-term project (e.g., development of an oil field after exploratory drilling); when substantial changes are proposed for project activities (e.g., proposed changes in location, frequency, timing and/or duration of a previously authorized activity or proposal of a novel activity); when a species in the project area receives Federal protection; when a previously undocumented federally-protected species or important habitat is identified in the project area. Reinitiation results in reassessment of impacts, including cumulative impacts such as climate change and consideration of new scientific information, such as climatically-induced changes in species distribution. The process also allows management agencies to retract previous authorizations if the new analysis finds that any of the changes that triggered the reinitiation would jeopardize the species.

Impacts from burning hydrocarbons produced as a result of Lease Sale 193. In 2011, BOEM's predecessor agency, BOEMRE, considered but did not analyze the effects of greenhouse gases emitted by consumption of oil and gas produced as a result of the lease sale. That supplemental EIS explained:

> Environmental and economic impacts of greenhouse gas emissions from oil and gas consumption are not effects of [Lease] Sale 193 as defined by the Council on Environmental Quality, and thus are not required to be analyzed under NEPA. Greenhouse gas emissions from consumption of Sale 193 oil and gas are not direct effects under NEPA because they do not occur at the same time and place as the action. They are also not indirect effects because Sale 193 would not be a proximate cause of greenhouse gas emissions resulting from consumption. Also, because the impacts of consumption are not direct or indirect effects of the Proposed Action, a cumulative impact analysis would not reveal an incremental or cumulative effect attributable to the decision to affirm, modify, or cancel the lease sale.
>
> There is no reliable methodology to assess the relation between leasing in the Chukchi Sea and changes in nationwide or worldwide oil and gas consumption levels. Consumption of oil and gas is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demography, and weather or climate. While on a national basis, lower

> levels of domestic oil and gas production could occur and may trigger some modest conservation measures having some benefits in terms of reduced greenhouse gas emissions, no single leasing decision would be expected to result in any discernable responsive conservation measures. This is particularly true with regard to Sale 193 where the actual productive capacity is currently an unknown. Furthermore, it is not known whether or to what extent Sale 193 oil and gas would be refined into plastics or other products that will not be burned, what mix of vehicles or power plants might utilize the product, or what mitigation measures would offset any such consumption.
>
> Moreover, BOEMRE does not regulate fuel consumption or carbon emissions at any level, nor does BOEMRE dictate the destination of the oil and gas produced from a Federal lease or the products to be refined from it, which would determine the emissions produced. While the Energy Information Administration has reported emissions from a variety of petroleum products (e.g., aviation gasoline, motor gasoline, etc.), natural gas and other gaseous fuels (e.g., methane, landfill gas, etc.), electricity, coal, and renewable sources, an attempt to translate this information into emissions from the ultimate consumption of the oil and gas produced under Sale 193 would be an unreasonably speculative exercise. [BOEMRE, 2011 p.23-24.]

This reasoning remains applicable today. BOEM took a hard look at whether emissions from combustion of oil and gas produced as a result of the lease sale could, in 2014, be calculated or assessed in a less speculative fashion than was possible when BOEMRE completed its prior NEPA analysis and concluded that it could not. BOEM experts also considered the studies and relevant information provided in comments. BOEM concluded that the methodologies available for determining the Proposed Action's effect on consumption, including those suggested by commenters, remain too speculative. Instead, BOEM engages in a qualitative discussion about the effects of the Proposed Action on climate change, while acknowledging the limitations of current science in this regard.

Finally, review of this issue has already occurred. The District Court upheld BOEM's analysis with respect to climate change effects and it was not challenged on appeal or otherwise identified by the U.S. Court of Appeals for the Ninth Circuit or District Court for consideration on remand.

Direct and Indirect Effects of the Proposed Action. NEPA requires an agency to consider the "indirect effects" of an action only when they are "reasonably foreseeable." 40 CFR 1508.8(b). Just as BOEMRE concluded in 2011, the potential impacts of contributions to GHG emissions from the future combustion of oil and gas that might be produced as a result of the lease sale are too remote to constitute reasonably foreseeable effects, and any such analysis would be overly speculative. There is no reliable methodology for calculating or assessing such effects. For all of these reasons, it was reasonable for BOEM to decline further analysis of this issue in the Second SEIS.

BOEM has revised the analysis of the impacts of GHG emission (Chapter 4, Section 4.3.3) to include a quantification of GHG emissions over the course of the Scenario. BOEM also has discussed the effects that climate change is having on the Arctic environment, as well as the Proposed Action's overall contribution to climate change.

BOEM disagrees with comments that suggest any additional contribution of GHG from the Proposed Action would lead to irreversible problems and costs caused by climate change. At this time, the impact of a single discrete project's contribution to climate change cannot be covered in more detail due to scientific uncertainty. Recent papers advocating that all undiscovered hydrocarbon deposits must remain undeveloped in order to avoid significant impacts and/or to meet global climate change goals are noted.

Black Carbon. BOEM has revised its discussion of the impacts of black carbon on climate change in Sections 4.3.3 and 5.1.3. This Second SEIS analyzes the effects of black carbon both as an air pollutant regulated pursuant to 30 C.F.R. Part 550 and as a contributor to climate change. BOEM's authority to regulate air pollutants is limited by OCSLA § 5(a)(8) to the extent to which those pollutants have a significant effect on the air quality of a state. For this reason, BOEM's NEPA analysis pays particular attention to the effects of air pollution at the shoreline. However, insofar as black carbon also has effects on climate change, those effects are analyzed in Sections 3.1.9, 4.3.3 and 5.1.3.

Cumulative Effects. The analysis of cumulative affects relating to climate change in Section 5.1.3 describes how impacts from climate change can combine with impacts from the Proposed Action to cumulatively affect the environment. When these cumulative effects are particularly relevant to an individual resource or species, they are analyzed along with the other impacts to that resource or species. For example, in Section 5.2.3.2 for lower trophic organisms, it is noted that "[a]lthough the effects of climate change will be long-term, the effects that would occur in the life of the project are not expected to considerably impact lower trophic levels," and "[o]ffshore oil and gas exploration and development is likely to increase in the U.S. Chukchi Sea and Arctic waters of other countries (i.e., Russia and Canada) as the ice cover recedes and allows access to previously inaccessible areas. These activities would add to the cumulative impacts of numerous ocean floor disturbances that affect lower trophic habitat across individual localized areas."

Section 5.1.3, as well as others in the Second SEIS, also acknowledges that the activities in the Scenario will contribute to global climate change, as will activities from other past, present and reasonably foreseeable actions. The GHG emissions from activities described in the Scenario are not qualitatively different from the GHG emissions emitted by any other past, present or reasonably foreseeable future action.

Methane. The Second SEIS does not exclude methane from its analysis. Section 3.1.9 specifically describes methane's role as a GHG, including the facts that "[m]ethane remains in the atmosphere for 12 years. Pound for pound, the warming impact from emissions of CH_4 is over 20 times greater than CO_2." Section 3.1.9 also provides analysis regarding impacts of methane releases to air quality generally, as well as to other resources, such as water quality and biological resources. The Second SEIS in Section 4.3.2.1 provides additional explanation for its conclusion that air quality impacts from methane releases would be negligible. The commenters' concerns about sources of methane, existing amounts of methane in the atmosphere and overall contribution of methane to global warming are noted.

Issue 10. Impacts on Air Quality

Summary of Comments

Several comments requested additional explanation regarding the implications of Congress' recent decision to shift OCS air quality regulation authority to BOEM from the EPA. It was submitted that the jurisdictional change merits a detailed discussion in the Final Second SEIS that explains the manner in which BOEM will regulate air emissions and the corresponding NEPA analysis implications.

Several comments expressed concerns about potential air quality impacts and/or made general recommendations to more tightly regulate emissions, including:

- Apply the Clean Air Act, include quantified and qualified GHG emission measures for local stationary and mobile sources, and discuss connections to climate change.

- Why is use of ULSD is not considered, since use of this fuel is required for vessels operating in State waters? Supply vessels and drilling vessels that enter state waters at port would be required to use ULSD.
- Describe how the EPA's recent proposed revisions to the ozone NAAQS could impact developments under Lease Sale 193.

Other comments offered specific critiques of the methodologies and analytical approach supporting the Draft Second SEIS's analysis of potential air quality impacts. While some comments found the impact analysis properly conducted and well-supported by data, modeling, and analysis; others found the analysis lacking in some manner and/or suggested improvements to the SEIS's analysis of air quality impacts. Commenters stated that the SEIS should:

- Include an air emissions inventory and modeling assessment of the development and production Scenario.
- Include a full-scale computer modeling analysis rather than the Gaussian dispersion equation.
- Not use the exemptions thresholds utilized in BOEM's AQRP because they are outdated and should not be used in this NEPA analysis.
- Not rely on dilution and diffusion as a means to address actual predicted impacts.
- Not rely on the use of VOC-NOx ratios to make a determination of the likelihood of ozone formation from the Proposed Action and any potential oil spill.
- Provide more details, as the lack of details makes it impossible to evaluate overall conclusions.
- Make the input parameters, assumptions, and results of the air quality impact analysis available for review as part of the SEIS.
- Base the various categories of impact severity (i.e., negligible, minor, moderate, and major) which comprise the Impacts Scale in the SEIS) on quantitative thresholds when analyzing air quality.
- Establish necessary binding and enforceable lease stipulations to ensure that levels of emissions from the proposed Scenario will not cause, nor contribute, to violations of health-based air quality standards; will not cause significant deterioration of air quality; and, will not have any adverse impacts on air quality-related values in newly designated Class II sensitive areas.

Note that comments related to GHG emissions and climate change impacts are discussed in the Issue Category concerning Climate Change.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Jurisdiction change. The recent change in jurisdiction for regulating emissions of air pollutants from sources on the Chukchi Sea OCS is described under the "Regulation of Discharges" subheading in

Section 4.3.2.1. As provided for in revised Section 328(a)(1) of the Clean Air Act (CAA) (42 U. S. C. 7627(a)(1) along with Section 5(a)(8) of OCSLA, BOEM is responsible for regulating emissions of air pollutants from offshore facilities on the Chukchi Sea OCS. BOEM will do so by implementing the existing rules for Pollution Prevention and Control at 30 CFR Part 550 Subpart C. These rules are referred to as BOEM's Air Quality Regulatory Program (AQRP). The AQRP requires lessees to demonstrate in their proposed EPs and DPPs that operation of proposed facilities will not significantly affect the air quality of a state as defined in 30 CFR 550 Subpart C. Where appropriate, BOEM's rules require the imposition of controls to reduce emissions from oil and gas activities. BOEM's AQRP incorporates certain ambient air quality standards promulgated by EPA pursuant to EPA's CAA authority. Relevant provisions of the AQRP are described in the Air Quality impacts analysis in Chapter 4. A more detailed description of the mechanics of this rule, or a comparison between this rule and previously applicable Clean Air Act provisions, is beyond the scope of this SEIS.

BOEM has initiated a new rulemaking process to update its existing AQRP. However, a Final Rule was not promulgated prior to release of this Final Second SEIS. The impacts analyses of Chapters 4 and 5 are therefore based on the operation of the existing AQRP. Because a new rule is not expected to weaken the substantive requirements of the existing AQRP in any manner, and the new rule would only serve to reduce potential impacts from offshore oil and gas activities, this Final Second SEIS adequately assesses potential impacts. Concerns regarding the sufficiency of BOEM's existing AQRP, along with suggestions about how to modify the AQRP going forward, are outside the scope of this lease sale analysis and should be reserved for the public comment opportunities that would accompany a Proposed Rule.

Emissions inventory. The air quality analysis has been revised to include quantification of emissions and details of the dispersion analysis. At the lease sale phase, there is no proposed plan against which to evaluate specific emission sources. In addition, such emissions would vary year-to-year and plan-to-plan. Therefore, it is appropriate to take a conservative approach in the analysis of activities, which is the approach taken here.

Dilution and diffusion. Dilution and diffusion result from the combination of wind and distance in the analysis of air pollution transport and dispersion, which are critical to the analysis of potential impacts. In the Gaussian Dispersion Equation, dilution and diffusion are represented by the σy and σz coefficients. While the emission rates and other meteorological conditions are also important, the relatively high average wind speed over the Chukchi Sea OCS Planning Area and the long distance from the shore to the nearest possible source on Lease Sale 193 is more than 60 statute miles are the controlling factors related to dilution and dispersion, and therefore, to pollution impacts from the Scenario described for Lease Sale 193. Increases in rates of emissions and changes in atmospheric stability would have a lesser effect than the wind and distance.

Gaussian plume dispersion. Gaussian Dispersion Equation is a mathematical screening model. The use of a screening model is appropriate under EPA 40 CFR part 51 Appendix W, Guideline on Air Quality Models. Refined modeling (full-scale computer modeling) is not to be used to the exclusion of other appropriate models, per Appendix W, paragraph 3.0(d). The Gaussian Dispersion model meets the requirements for a simple terrain screening model, per Appendix W, paragraph 4.1(b); the model uses worst-case meteorological conditions, per paragraph 4.2.1.1(b); a screening-level model is appropriate to provide conservative estimates, per paragraph 2.2(a); the model is the basis for all the procedures of steady-state models preferred by EPA, including AERMOD and SCREEN3, per the AERMOD User's Guide and the SCREEN3 User's Guide, and as described in the Workbook of Atmospheric Dispersion Estimates (Turner,1970).

ULSD. Emission factors that are revised based on the use of ULSD are not available. Rather than applying a correction to the SO_2 emission factors, the published emission factors were used that reflect the worst- case for sulfur emissions.

AQRP thresholds. Although the emission exemption thresholds published under 30 CFR part 550 Subpart C were discussed in the air quality analysis, the thresholds were not used in the analysis to determine impacts.

VOC-NO_x ratio. The ozone isopleth diagram is a well-established tool used to support plans to control ozone (i.e. informing decision-makers whether it is better to reduce emissions of VOC or NO_x to control ozone) and can also be used to categorize areas where, because of the mixing ratio, the area is either NO_x limited or VOC limited and therefore unconducive for the formation of ozone. (Ahrens, 2013; Jacobson, 2002; Finlayson-Pitts and Pitts, 2000). The text of the air quality analysis in section 4.3.2.1 has been revised.

Disclosure of analysis. The air quality analysis will be revised to include quantification of emissions and details of the dispersion analysis. At the lease sale phase, there is no proposed plan against which to evaluate specific emission sources. In addition, such emissions would vary year-to-year and plan-to-plan. Therefore, it is appropriate to use a conservative approach in the analysis of activities, which is the approach taken here.

Severity of impacts. The impacts of emissions under the Lease Sale 193 Scenario were judged relative to the EPA significance levels (40 CFR 51.165(b)(2)). The impacts were then examined and categorized in the same manner as every other resource analysis presented in the document.

Application of controls. Control of emissions can be appropriately applied to stationary sources. The impacts of stationary sources of emissions resulting from any plan proposed under the Lease Sale 193 Scenario are regulated by BOEM OCS Alaska according to the rules established under 30 CFR Part 550 Subpart C. The imposition of controls would be inappropriate here at the lease sale stage because the regulation can only be applied to each individual plan proposed, based on the location and projected emissions of each plan, and submitted to BOEM. Under this rule, BOEM ensures that levels of emissions from stationary sources, which are expected to occur from plans proposed under the Lease Sale 193 Scenario will not cause a significant effect on the air quality of a state. If compliance to the regulation is not sufficiently demonstrated for each plan proposed under the Lease Sale 193 Scenario, such plans will not be approved by BOEM.

Regulatory changes. It is beyond the scope of the air quality analysis in a NEPA document to speculate about the impact of rule changes or proposed rules. Each plan proposed under Lease Sale 193 will be examined and must comply with the current standards published by the EPA that incorporated into BOEM's AQRP. Meeting the new standards for ozone will reduce impacts to public health and welfare.

Secondary particulate matter formation. The assessment of the secondary formation of fine particulate matter ($PM_{2.5}$) in an Arctic environment is being investigated through in a study BOEM is sponsoring to assess the impacts of offshore oil and gas exploration, development, and production on the Chukchi Sea and Beaufort Sea OCS Planning Areas. The study, "Arctic Air Quality Impact Assessment," was contracted in September 2013 and results are expected to be published in 2017. The study will assess cumulative impacts based on a comprehensive inventory of existing and projected emissions from North Slope sources and will assist BOEM in the regulatory assessment of air quality under NEPA.

Additional information on secondary $PM_{2.5}$ formation could be relevant in determining air quality impacts, if it were available. However, until the Arctic Air Quality Impact Assessment is completed, BOEM cannot estimate the potential secondary formation of particulate matter from the activities anticipated under the Scenario. The EPA-approved method of predicting secondary formation of $PM_{2.5}$ is through photochemical computer simulation modeling, using a model such as the Comprehensive Air Quality Model With Extensions (CAMx). Through the BOEM Arctic Air Quality Study, BOEM is developing the WRF 3D meteorological database required to run a photochemical model. BOEM has taken a thorough look at primary emissions of particulate matter and concluded that the impact is negligible. Because impacts from directly emitted $PM_{2.5}$ would remain negligible, and any additional $PM_{2.5}$ which may form through secondary processes would be subject to the strong influence of dilution and dispersion, no significant impacts from secondary formation of $PM_{2.5}$ are anticipated.

One comment also suggests that BOEM should account for primary and secondary particulate matter emissions from multiple exploration programs. BOEM's air quality analysis already accounts for multiple exploration drilling rigs and their associated support vessels each year. For example, in the first phase of the Scenario, it is assumed that two drilling rigs will operate in most years, and in later phases, three or four. While it is possible that a single Exploration Plan ("program") could use two rigs, and therefore be able to take advantage of some economies of scale in terms of support vessels, BOEM's air quality analysis makes the more conservative assumption that each drilling rig is part of a single program, and assumes a full fleet of support vessels for each rig.

Assumptions pertaining to vessel operation. The use of ice management vessels and support vessels are all accounted for in the emissions inventory and dispersion analysis presented in the air quality analysis. The operation of icebreaker vessels is based on several exploration plans submitted to BOEM between 2011 and 2014. Many of the engines are presumed to operate 24-hours a day for the duration of a plan; however, the operation of propulsion engines are not necessary 24-hours each day because the icebreakers are typically anchored up to 30 nautical miles from a drilling unit and while anchored, would not be operating their propulsion engines. Icebreakers are assumed to operate 26% of the time. Some of the support vessels, such as anchor handlers, oil tankers, and some of the oil-spill response vessels, are also presumed to operate 24-hours each day. Other support vessels, such as crew boats and science vessels are assumed to operate 24-hours a day on the days they are needed. By assuming the icebreakers and other support vessels are continuously in motion, i.e., operating 24 hours a day, emissions estimates are actually overstated. Without concrete plans to analyze, BOEM chooses to take this more conservative approach to estimating emissions.

Effects of increased vessel traffic in the Arctic. The air quality assessment offers a qualitative assessment of the cumulative impacts of the Scenario combined with emissions of increased vessel traffic in the Chukchi Sea OCS Planning Area. While there is likely to be ocean traffic in addition to the sources of emissions from the Scenario, the emissions from most of these mobile sources would occur at a different time and place as the sources associated with the Scenario, and thus, the majority of emissions would not mix with the emissions from the Scenario, rendering any cumulative effect nonexistent or negligible. Emissions from mobile sources such as ocean-going vessels are mitigated under the International Convention for the prevention of Pollution from Ships, also referred to as MARPOL. MARPOL Annex VI limits the emissions of nitrogen oxides, the most prominent pollutant from large ships, and the United States is a signatory country agreeing to the regulations included in Annex VI.

Issue 11. Impacts on Marine Ecosystems

Several comments address potential impacts to marine ecosystems, including impacts to water quality, lower trophic organisms, and fish. General comments are as follows:

- The marine ecosystem there is very fragile, and the animals are already under great stress due to climate change.
- The Arctic already has high level of toxins accumulated in the indigenous animals.
- The Arctic Ocean and its irreplaceable wildlife are incredibly sensitive to oil spills and other ecological mishaps, and are already being stressed by global warming. Its microorganisms also comprise much of the underpinnings of the food chain for our temperate oceans off our East and West Coasts, including support of our fisheries, etc.
- Areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna and Herald Shoals, are critical to the health of this ecosystem and will provide resilience in the face of climate change.

Several comments expressed concerns about potential water quality impacts and some made general recommendations to tightly regulate discharges. Other comments took issue with specific portions of the Draft Second SEIS's analysis of water quality impacts.

- One commenter states that, on account of persistence of spilled oil in the environment, the impacts to water quality should be considered "major" for Periods 2-5 of the Scenario.
- This commenter also cited turbidity as a primary concern during dredging operations associated with pipeline installation. This commenter asserts that dredging in the high-energy environment of the Chukchi Sea would create turbidity exceeding USEPA standards.

Several comments stressed the importance of lower trophic organism to fish, pinnipeds, and cetaceans, and to marine ecosystem generally. Several comments worried about contamination of lower trophic and resulting biomagnification. One comment stated that BOEM failed to specifically consider significant new information provided by Greenpeace on 16 August 2012 in its Draft SSEIS analyses as required by NEPA the significant abundances and densities of the cold water soft coral, Gersemia rubiformis in the Chukchi Sea Planning Area. Several comments referred to adverse effects on tomcods from past seismic activities. One comment recommended updates to the SEIS's characterization of fish distribution.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Spill impacts. The premise of this comment, that oil from a large spill could potentially persist in the sediment of the environment for 30 years after a large spill (5,100 bbl if from a platform or 1,700 bbl if a pipeline spill), is based on a reference in the text of the water quality section. This reference is a research study, "Review of State-of-the-Art on Modeling Interactions Between Spilled Oil and Shorelines for the Development of Algorithms for Oil Spill Risk Analysis Modeling," December 2007, an MMS-funded OCS study. The function and purpose of this study is to present an objective and complete review of the interaction between various oil types and all possible shoreline types. As such, BOEM's analyses and level of effects are focused toward open ocean environments 60 miles offshore. Referring to Section 4.1.2.5, Tables 4-1 and 4-2, pages 152-154, the chances of oil reaching the shoreline in a state that would cause the level of effects referred to by the author of this statement

is small. Therefore, BOEM stands by the Level of Effect as determined within the Exploration, Development, and Production phase referred to in the comment.

Lower trophic organisms. Lower trophic organisms and their importance to the ecosystem are described in Section 3.2.1. With respect to biomagnification, faunal samples tested included amphipods, clams, the snow crab (*Chinoecetes opilio*), and Arctic cod. Laboratory results showed minimal evidence of elevated mercury or biomagnification when compared to background mercury levels within this range of organisms. Meanwhile, discussion of corals, including rubiformis, are included in the Benthic Communities in the SEIS Section 3.2.1. While prominent, this and other corals are just one part of the complex benthic assemblages in the project area. The SEIS gives the appropriate holistic treatment to these and other organisms. Impacts from oil spill to lower trophic organisms are analyzed in Section 4.3.4.

Important areas. The referenced areas, along with their importance to marine ecosystems, are described in Chapter 3 and referenced in Chapters 4 and 5 where appropriate to inform the effects analysis.

Seismic surveys. Both Arctic cod and saffron cod are referred to as tom cod. Many factors could be responsible for changes in fish distribution -- climate change being one of them. Limited information indicates Saffron cod are found at deeper depths than Arctic cod (15-50 meter depths), and spawn near the shore and closer to shore. Data and modeling indicates saffron cod seem to thrive in warmer and more southerly waters than Arctic cod. Limited information indicates that Beaufort residents have seen increasing numbers of saffron cod in the last decade.

In regard to seismic surveys, however, it is not likely that they would cause a permanent change in fish distribution. Seismic surveys can affect and possibly harm fish both physically and behaviorally (cause them to move away from habitat). The physical impacts include rupturing a swim bladder, damaging tissues, or harming fry or eggs. These impacts occur when fish and fry/eggs are close to the airgun when it fires (up to 15 feet from the airgun) Behavioral impacts include alarming fish and causing them to move away from an area. However, marine fish are widely dispersed and are largely unrestricted in their movements. Because of the temporary nature of the noise associated with seismic surveys and the use of standard ramp up procedures, most mobile fish have an opportunity to move away before the seismic surveys begin. Overall, it is anticipated that effects from seismic surveys are short-term, and would not have measurable effects on marine fish populations.

Fish distribution. The Final Second SEIS has been updated to reflect information submitted in comments concerning fish distribution.

Issue 14. Impacts on Marine Mammals

Summary of Comments

Several comments address the analysis of potential impacts to marine mammals. General comments include:

- More sources should be reviewed concerning the impacts of noise on marine mammals.
- Terminology used in connection with assessing marine mammal impacts is potentially confusing and should be clarified.
- It seems incongruous that on page 595 it states that impacts to bowhead and beluga whales are “moderate,” but in the cumulative impact section, it states that impacts from the Proposed Action will be “negligible.”
- It really bothers me when seismic activity occurs in April, May and September, when the whales are migrating past Point Hope to and from Canada.

- Barrow Canyon and the spring lead are very important (either to walruses or marine mammals generally).
- Even at 2,000 feet, animals (e.g., belugas, bowheads, walrus, and seals) and people can still hear these airplanes and they are disturbed.
- Seismic surveys have resulted in dead grey whales, seals losing their hair, and loss of tomcods.

More specifically, many comments stressed the importance of bowhead whales and expressed concern about adverse impacts to this species – a critical species for Inupiat subsistence harvests in the region – and their habitat. It was explained that the reason the bowhead stock is doing so well is because the habitat is in such good shape, and that people want to maintain this and keep the habitat as pristine as possible. Seismic activity was also a concern – particularly any activity that may occur in April or May when the whales are migrating north, or in September when the whales are migrating west and south out of Canadian waters.

The literature supporting the bowhead whale impacts analysis section was characterized as current, although there was a suggestion to cite a study that confirms TK that bowhead whales can smell. One comment questioned the characterization of impacts to bowhead whales as "moderate" compared with the statement in Chapter 5 that impacts from the Proposed Action would be "negligible." A comment also questioned the statement that ship strikes would be a greater source of mortality than oil spills. It was also asserted that baleen fouling is probably the biggest threat to bowhead whales from an oil spill; more consideration of associated energetic costs was suggested. In addition to disturbance cause by vessels, noise, smells, and oil spills, several comments pointed to potential disturbance from airplanes, even those flying at altitudes of 2,000 feet.

Several comments raised considerations specific to beluga whales. The importance of the beluga whale hunt to Point Lay was emphasized. It was also noted that recent information shows many beluga whales migrate in the spring toward Kaseguluk Lagoon from offshore areas, not strictly up the spring lead system as previously assumed. Comments requested that BOEM not authorize activities in the Chukchi Sea even 50 or 60 or 70 miles offshore until the beluga hunt in Point Lay is finished or until July 15th, whichever comes first.

Many comments raised issues related to walrus. Hanna Shoal was cited as an important feeding area. "Given that walrus are being considered for listing under the ESA and potentially could impact subsistence hunting at some points or another", a comment stated, BOEM needs "to make sure that their feeding habitats [are] protected and their coastal haulout areas are also protected." Recent terrestrial haulouts were presented as indicative of adverse impacts to walrus from climate change and as a source of additional impacts from placing walrus far from food sources and exposing mothers and calves to the risk of trampling from stampedes. A comment also stated that walruses seem to be more tolerant of seismic vessels or other human activities, but amazingly little is known about what walruses hear in air and in water. This is pointed out as a data gap that needs to be evaluated and a risk that BOEM needs to address.

Some comments focused on potential impacts to seals, asserting inconsistencies with how the SEIS characterizes the impact of climate change on bearded seals, and requests that the SEIS consider disruptions to ringed seals due to construction, presence of infrastructure, and potential spills. Comments also cited the recent changes in the Endangered Species Act status of certain seals.

Finally, some comments focused on impacts to polar bears. One comment stated that the polar bear population in Northeast Alaska and Northwest Canada has dropped to 900 animals, and warned against potential effects to polar bear species from an oil spill. Another comment references a recent study published in *Ecological Applications* that notes that the polar bear population decreased 40%

between 2001 – 2010 because of climate change, and opined that the animals should not be put into further peril by allowing drilling in their habitat.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Terminology. Text has been modified to clarify terminology used in marine mammal sections.

Noise. Additional information has been provided in Section 4.3.7 concerning studies related to the impacts of noise on marine mammals.

Aircraft. NMFS has typically used a 1,500-foot minimum altitude requirement as mitigation for aircraft disturbances to marine mammals. Published scientific research supports this minimum altitude requirement and it is one of the standard mitigations NMFS has required. BOEM takes this information into account when performing effects analyses.

Seismic. BOEM-authorized seismic activities in the Chukchi Sea cannot occur until after July, which is after all spring whale, seal, and walrus migrations have finished.

Herald and Hanna shoals. Surveys have not observed many gray whales feeding in this area. Bowhead whales migrate across Hanna Shoal and other areas of the Chukchi Sea during their fall migration. Fin, Humpback, and minke whale observations have been lacking in the Leased Areas and mostly non-existent in the vicinity of Hanna Shoal. COMIDA surveys, marine mammal monitoring, BOWFEST studies, and other scientific information supports the information in Chapter 3, Section 3.2.4.

Ship strikes. A large spill in the Scenario is estimated at 5,100 bbl. By comparison, the Exxon Valdez Oil Spill (EVOS) was at least 240,000 bbl. Quantitatively this means that the largest foreseeable spill in the Scenario is less than 1/47th the size of the EVOS. This means that the smaller spill would weather, volatize, and be cleaned up in much less time than would occur with a very large spill such as the EVOS. In 1969, an offshore spill occured off the coast of Santa Barbara which ultimately leaked 80,000-100,000 bbl of oil into coastal waters where seals, sea lions, gray whales, dolphins and porpoises occur. In the 1969 Santa Barbara spill, some pinniped and a few cetacean mortalities were associated with the spill; however, similar to the EVOS, the Santa Barbara spill was at least 15.7 times the size of the large released described in the Scenario. The EVOS and Santa Barbara spills were respectively 45 and 15.7 times the size of the largest spill in the Scenario and it is assumed a smaller spill would affect fewer marine mammals. The smaller size and composition of the 5,100 bbl spill suggests it would weather and volatize more rapidly in the Chukchi Sea, and that it would be much easier to contain and manage.

Most marine mammals are seasonal migrants to the Chukchi Sea, and would only be directly affected by a spring and summer spill. Crude oil in the water can foul baleen whales. However, for such an event to occur, baleen whales would have to be feeding in oily water in an area where schools of prey species are mixed in with the oil. Considering most baleen whales feed in coastal areas, particularly between Point Lay and Barrow, Barrow Canyon, and the Chukotkan Coastline; spills that do not

contact those areas are less likely to affect baleen whales. The topic of baleen fouling has been included in the general effects to marine mammals on page 273 and analyzed on page 299.

Bowhead conclusions. Serious injury or mortality to a whale is construed to be a moderate level of effect from any impact producing factor. The main difference between moderate and major levels of effect in this example would be whether (or not) the injury or mortality affected the population in a significant manner. Moderate effects could include some mortalities; however, the population would not be affected. Major effects include injury, mortalities, etc., that actually affect the population. With respect to vessel traffic and whales, it is reasonable to assume with 2+ weekly trips between the coast and each offshore development, over the course of oil and natural gas production, at least one whale will be injured or possibly die from being struck by a vessel. However, as stated in the analyses, the number of such incidents should not individually or cumulatively produce population level effects.

Hanna Shoal and walrus. The importance of Hanna Shoal and designation of Hanna Shoal Walrus Use Area (HSWUA) are analyzed in Section 3.2.4 ("Pacific Walrus") of the second SEIS. Hanna Shoal is also identified as an Environmental Resource Area for the purposes of Oil Spill Risk Analysis (Appendix A, second SEIS) and analysis of impacts to walruses from unauthorized discharges stemming from Lease Sale 193 exploration, development, and production activities (Sections 4.3.7.1 and 4.5.7.3). Potential impacts to walruses and HSWUA from other Lease Sale 193 exploration , development, and production activities (e.g., aircraft traffic over terrestrial haulouts, sea floor disturbance) are analyzed and discussed in Section 4.3.7.1. Cumulative impacts to walruses and HSWUA are examined in Sections 5.2.6.1, 5.2.6.3, and 5.2.6.4 of the final second SEIS.

Walrus hearing. The information provided in the second SEIS on walrus' response to anthropogenic noise is the most current sound scientific information available. Much remains to be studied with regards to the sensitivity and behavioral responses of marine mammals, particularly pelagic and Arctic species such as walruses. The dearth of information is due in large part to the often cryptic life histories and remote ranges of these species, which complicate research logistics, and to limitations of current technology and study methods used to quantitatively assess marine mammal hearing. BOEM provides ongoing financial support for research projects that expand scientific knowledge of Arctic flora, fauna, and ecosystems in ways that allow for greater precision in analyzing potential impacts of OCS lease sale activities. Study reports, project proposals, and opportunities to submit ideas for additional research are available through our Environmental Studies website at http://www.boem.gov/akstudies/.

Walrus and ESA. Delineation and enforcement of protected habitat for ESA-listed species falls under the jurisdiction of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (i.e., these tasks are outside of BOEM's authority as a Federal agency). Wherever applicable, BOEM has included in the second SEIS discussion of habitat that has been identified as important to ESA-listed and candidate species (such as the Hanna Shoal Walrus Use Area, Chukchi Sea spring lead system, Barrow Canyon, and Point Lay near- and off-shore areas). Potential impacts to important habitat areas as well as habitat types (i.e., wetlands) from exploration, development, and production in the Leased Area are discussed throughout Chapter 4 of the SEIS and, for Oil Spill Risk Analysis, specific geographical areas of importance are identified for each biological resource (i.e., walrus) so that BOEM could spatially and temporally model the potential for a large spill to contact a given area (Appendix A of the second SEIS).

As detailed in Section 2.3 of the Second SEIS, the Scenario analyzed is hypothetical. Any actual proposed oil and gas exploration, development, and production activities would be subject to multiple sequential environmental impacts reviews as required under the National Environmental Protect Act, the ESA, and other Federal and state laws and regulations. In additional to impacts analysis, these incremental processes would identify required mitigation measures aimed at limiting effects of oil and gas activities to protected species and their habitats. These impact analyses and

mitigation measures would consider the federally- and state-identified important habitats that exist at the time of the environmental review.

Barrow Canyon, spring lead system. There are no leases in these areas, and no plans for industry to work in these areas.

Aircraft. NMFS has typically used a 1,500-foot altitude minimum as mitigation for aircraft disturbances to marine mammals. This minimum altitude requirement is supported by published scientific research and is one of the standard mitigations NMFS has required. BOEM takes this information into account when performing effects analyses.

Seismic. There is no documented evidence anywhere of gray whales or seals dying from seismic surveys. There has never been any linkage, anecdotal or otherwise, between hair loss in any mammal and seismic surveys in the ocean.

Haulouts. The sensitivity of walruses hauled out on shore to anthropogenic activities is discussed in multiple sections of this SEIS, including, but not limited to: Section 3.2.4 ("Pacific Walrus"), Section 4.3.7.1 ("Pacific Walrus ERAs", "Effects by Species – Pacific Walrus"), Section 4.3.7.3 ("Alternative III-Corridor I Deferral"), Section 5.2.6.3 ("Pacific Walrus"). Several sentences have been added to the cumulative impacts analysis concerning terrestrial haul-outs.

Climate change and seals. Potentially inconsistent statements concerning the impacts of climate change on seals (particularly bearded seals) have been reconciled in the Final Second SEIS.

Ringed Seals. The topic of infrastructure and construction on seals was analyzed in the bearded seal effects subsection. It has now been reiterated on page 309 in the ringed seal subsection. The effects of oil spills on ringed seals are described in the ringed seal subsection on page 310.

Polar bears. In November 2014, U.S. Geological Survey (USGS), U.S. Fish and Wildlife Service (USFWS), and collaborators published findings of a study that used mark-recapture models to investigate population trends for the Southern Beaufort Sea polar bear stock for the years 2001-201. They found a low survival rate through the mid-2000s, after which survival rates for adult bears and cubs stabilized while survival rates of subadults continued to decline. The reason(s) for stabilization of survival rates in a subset of the stock and lack of stabilization in another subset is not known. While research indicates that changes in sea ice habitat are a driving force behind survival of the stock, this study suggests that, at least in the short-term, multiple factors impact polar bear population dynamics. BOEM recognizes the need for identification and additional information on these unknown factors so that management agencies can improve long-term polar bear population management strategies and the agency provides ongoing financial support for research projects that expand scientific knowledge of arctic flora, fauna, and ecosystems in ways that allow for greater precision in analyzing potential impacts of OCS lease sale activities. Study reports, project proposals, and opportunities to submit ideas for additional research are available through our Environmental Studies website: http://www.boem.gov/akstudies/. USGS and USFWS also conduct ongoing research and analysis (http://alaska.usgs.gov/science/biology/polar_bears/) aimed at providing information that will improve management of polar bears and other Arctic species in the U.S.

Issue 15. Impacts on Birds

Summary of Comments

Several comments address potential impacts to marine and coastal birds and raised specific questions or recommended specific revisions to the SEIS. Some of these comments focused on the vulnerability of birds to collisions with vessels and infrastructure and to contact with spilled crude oil. The USFWS provided extensive comments, primarily on analyses of marine and coastal birds, but also on marine mammals and fish. Their comments are categorized as follows:

- Numerous suggestions were provided to enhance and improve descriptions of individual species' movement patterns, locations, population estimates, population trends, and life history strategies.
- Discussions within IPFs need to be more robust and clearer to understnad. In some cases, potential impacts are not mentioned, and in other case the discussion is too sparse and do not clearly identify scale of impacts. Discussion of bird:vessel encounters and the enumeration of the encounters and associated mortality was confusing.
- The IPFs categories are too broad. For example, visual impacts could be its own IPF rather than being nested within Physical Presence/Vessels.
- Conclusions: IPF discussions do not clearly feed into the overall conclusory statements. Also, use of the terms in the conclusions was confusing. e.g., what is meant by minor? If impacts could increase above a "moderate" level, what level would they increase to?

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

The text has been revised and updated to reflect comments from the USFWS and other sources and to improve the clarity of the analysis and conclusions. BOEM incorporated virtually all suggestions from USFWS concerning descriptions of how, when, and where birds use the Leased Area and adjacent areas. The Final Second SEIS describes in detail the adverse effects to birds associated with collisions (with offshore vessels as well as onshore infrastructure) and oil spills.

Issue 16. Impacts on Terrestrial Mammals

Summary of Comments

Several comments address potential impacts to caribou and other terrestrial mammals. Particular concern was expressed with respect to the Western Arctic caribou herd, asserted to be undergoing a major crash that could adversely affect subsistence harvest of these animals and thus increase residents' reliance on marine resources. One comment identified a potential for an increase in air pollutant to adversely affect lichen communities and thereby adversely affect ungulates, especially caribou. Analysis of potential effects relative to arctic critical loads for nitrogen, sulfur and heavy metals was encouraged. Finally, one comment asserted that wolves and red foxes will be affected by oil and gas activities in the region, and that the terrestrial mammals section should address those impacts.

Summary of Comments

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations

- Corporations and Industry Groups
- General Public

Response to Comments

Analysis of impacts to terrestrial mammals, including caribou, is provided in Sections 4.3.8 and 5.2.7. This analysis takes into account the current population status of the Western Arctic herd. The analysis does not foresee anticipated impacts to caribou from changes in lichen communities from air pollutants. Effects on wolves and red foxes are included under the general heading "Furbearers."

Issue 17. Economic Impacts

Summary of Comments

Many comments raised the potential economic impacts of Lease Sale 193 and subsequent exploration, development, and production activities on the local, regional, state, and national scale. Most comments focused on positive economic impacts, citing studies that estimated, for example, development of the Alaska OCS could result in 55,000 thousand jobs, a $145 Billion payroll, $200 Billion for the Federal treasury, and 700,000 bbl/day through TAPS. Many comments focused on potential economic impacts to local communities, and requesting additional explanation or analysis of how positive economic impacts would flow to local people on the North Slope.

Many comments also expressed concern about the opportunity costs associated with not proceeding with oil and gas activities in the Chukchi Sea. While most of these concerns were heard at the state and national levels, they were also shared by some at the local level who regard the importance of property tax revenues from onshore oil and gas infrastructure to the NSB and its communities.

Conversely, several comments requested that the SEIS consider the social costs and other externalities associated with offshore oil and gas activities, namely pollution, contributions to climate change, and health impacts in local communities.

One comment requested analysis of how Stipulation No.7 curtails economic opportunities for Point Lay and its village corporation.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Chukchi Sea exploration, development, and production would contribute to the large role that petroleum plays in the Alaskan economy, creating jobs directly and indirectly, through revenues accruing to state and local governments, and through state savings accounts established with oil revenues. Increased revenue, employment, and personal income provide new opportunities and an increased capacity for local governments to meet public service needs and improve the quality of life for local residents. A more diversified economy can help local governments address fundamental aspects of quality of life, such as maintaining traditional culture and the subsistence way of life, while also providing for human health, public safety, education and public sanitation.

Employment Effects. The SEIS finds that oil and gas exploration, development, and production activities within the Alaska OCS would indeed create jobs and many economic benefits for the U.S. economy, the State of Alaska, the North Slope region and various governmental entities. Increases in employment from OCS activities could more than offset employment losses from declining production on State lands. While a relatively small share of direct jobs are expected to be taken by local residents, most of the infrastructure, government, and support jobs are expected to be taken by local residents. Production from Lease Sale 193 would also help extend the life span of TAPS, which BOEM recognizes as critical to the State and local economy. Prolonging the lifespan of TAPS would generate economic opportunities in a wide array of industries throughout the State. Section 4.3.10.1 of the SEIS provides a more detailed description of the potential economic effects from Lease Sale 193 activities.

BOEM analysts have reviewed the referenced Northern Economics Inc. and University of Alaska (UAA) study and found it to be a thorough analysis of the potential economic impact effects if the assumed levels OCS oil and gas development and production activities occurred in various portions of the Alaska OCS. Because the UAA study analyzes a different exploration and development scenario than does the SEIS, and because the employment, income, and revenue estimates reflect assumptions of potential activities in several other planning areas outside the Chukchi Sea, its conclusions regarding net job growth and payroll are not incorporated here.

New Revenues. If development and production were to occur as a result of Lease Sale 193, State and local governments would continue benefit from direct and indirect revenues in the form of property taxes, corporate income taxes, TAPS tariff reduction benefits, and personal income spent in the State by those working in oil and gas-related jobs. State and local governments could also benefit from potential revenue sharing mechanisms not currently in place. Section 4.3.10.1 of the SEIS provides a more detailed description of the potential revenue effects from Lease Sale 193 activities.

Local benefits. As a result of Lease Sale 193, the North Slope Borough and its communities would continue to rely on property tax revenues from onshore oil and gas infrastructure to be a significant source of government revenues and local employment. Section 4.3.10.1 of the SEIS provides a more detailed description of the potential local and State benefits from Lease Sale 193 activities.

Social Costs of Carbon. The U.S. Government's Interagency Working Group (IWG) on the Social Cost of Carbon has developed an estimate of the economic costs associated with an increase on carbon dioxide emissions, i.e., the social cost of carbon (SCC). The social cost of carbon is designed as a comprehensive estimate of climate change costs due to its impacts on net agricultural productivity, human health, and property damages from increased flood risk. The USDOI has been participating in active efforts to develop consistent guidelines for estimating SCC and incorporating those estimates in decision making documents. As noted by the IWG, "any assessment will suffer from uncertainty, speculation, and lack of information about (1) future emissions of greenhouse gases, (2) the effects of past and future emissions on the climate system, (3) the impact of changes in climate on the physical and biological environment, and (4) the translation of these environmental impacts into economic damages" (IWGSCC 2013). Further, as noted by the IWG 2010 SCC Technical Support Document, additional uncertainties and limitations of SCC include the need to improve quantification of both non-catastrophic and catastrophic damages, treatment of adaptation and technological change, how inter-regional and inter-sectoral linkages are modeled, and the sensitivity of SCC to changes in the underlying models.

At this time, the USDOI does not have an official policy in place concerning whether, how or when its bureaus should incorporate the monetization of the SCC in NEPA documents. BOEM has determined that for the Second SEIS, it is not necessary to estimate the SCC for either "end use of FLS 193 oil and gas production" or activities from the Scenario. The consumption of oil and gas produced as a result of the lease sale is not a reasonably foreseeable effect of the Proposed Action, for

reasons discussed in BOEM Response to Comments regarding [Global Climate Change Challenges]. With regard to the amount of GHGs emitted by the activities in the Scenario, BOEM has included a quantitative and qualitative analysis in the Second SEIS, along with a discussion of the effects of climate change on the Arctic environment. While BOEM has considered information in the IWG's SCC document, BOEM is unpersuaded that a monetary estimate of the cost to society of these GHG emissions is helpful in making a reasoned choice among alternatives. The Second SEIS is not a cost-benefit analysis of all the environmental and socioeconomic impacts of the Proposed Action. BOEM prepares that type of analysis for each five-year plan and not for each lease sale.

Stipulation No.7. As explained in the Oil-spill response and cleanup Issue Category, BOEM does not consider Stipulation No.7 to preclude oil-spill response and cleanup exercises offshore of Point Lay; therefore, BOEM does not find any adverse economic effects to Point Lay associated with the stipulation.

Renewable Energy. Issues pertaining to economic impacts from renewable energy development are important, but exceed the scope of analysis of the SEIS.

Issue 18. Suggested Mitigation

Summary of Comments

Many comments proposed new mitigation measures, changes to the way that BOEM handles mitigation, or changes to how BOEM regulates offshore oil and gas activities generally. Many of these suggested mitigations are addressed in other Issue Categories. Comments suggesting mitigation measures not discussed elsewhere are as follows:

- Since all of the actual effects of operations are uncertain, it is important to adopt a cautious approach where you move slowly and monitor heavily.
- The 25-mile coastal deferral buffer is good, but it is inadequate to protect critical resources and subsistence harvests. This buffer should be expanded to 60 miles and a deferral area around Hanna Shoal should be added as well.
- The size of projects may be limited to minimize effects.
- Stringent anti-air pollution and water pollution standards should be required.
- BOEM should require a zero discharge policy to protect fish, whales, and seals. The government should also regulate or pressure vessel traffic through the Chukchi Sea to abide by zero discharge.
- BOEM should require marine mammal observers.
- Oil companies should be required to surround each rig with a series of floating docks that mimic ice floes, so that animals which rest and/or breed on ice can take up homes on them. These docks would also act as buffers against real ice floes.
- Establish a subsistence trust fund to be administered jointly with tribes from the Northwest Arctic, North Slope and Bering Strait regions.
- Reach out to subsistence advisory councils for input, and/or form a subsistence advisory council to help prevent conflicts
- Share revenues derived from OCS leasing and production with the local communities who bear much of the risks associated with potential oil and gas activities in the Chukchi Sea and on the North Slope of Alaska. This is both a matter of basic fairness and as a means to ensure the continued survival of local people and cultures.

- The proper formula for a distribution of revenue sharing would be a direct relationship between the Federal Government and the NSB, rather than as a pass-through throughout the State.
- The NPR-A mitigation impact fund program is a good example of how Federal revenues can (and should be) shared with affected communities.
- Require industry to pay for more Coast Guard icebreakers in the Arctic Ocean to provide for timely emergency response in cases of oil spills or other emergencies or hazards.
- Require, with every permit approval, an enforceable plan to ensure that all otherwise externalized costs are internalized by the operator; a trust fund would be a first step.
- Protect rivers, streams, and creeks from oil spills.
- Use OPA 90 money to help communities prepare to respond to future spills.
- Require operators to put up bonds to cover the full cost of any cleanup.
- BOEM should require operators to fully reimburse local communities and residents for any costs incurred in the event of an oil spill, including the cost of food required to replace subsistence harvests.
- Revise BSEE's Well Activity Report (Form BSEE-0133).
- Enact an MOU between BSEE, BOEM, EPA, USCG, and the SEC.
- Ask NMFS to take certain actions pursuant to the ESA
- Improve public and government access to, and sharing of, information from companies conducting offshore drilling operations.
- Prohibit pipelines or onshore infrastructure near Barrow.

In contrast to the suggestions listed above, many other comments asserted that existing mitigation measures (i.e., other Federal laws and regulations, lease stipulations, etc.) provide sufficient protection for this stage of the OCLSA process, and suggested strengthening this conclusion in the SEIS. Similarly, some comments asserted that existing regulatory restrictions are already over-burdensome and are hindering responsible development of U.S. Arctic energy resources, stymying national and local economies, negatively impacting jobs and new business development and jeopardizing our national security.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

The Final Second SEIS also identifies required mitigations measures (such as lease stipulations) and expected and potential mitigation measures that could be applied as conditions of future approvals. Proposed mitigations concerning later stages of the OCSLA process will also be taken under advisement. The following responses to issues out of the scope of the present analysis are provided to the extent practicable:

Precautionary approach. The Obama administration has made it clear that it will take a cautious approach to oil and gas exploration, development, and production in the Arctic. This cautious

approach dovetails with the staged approach to offshore development mandated by the OCSLA, which provides multiple opportunities to review the potential impacts of proposed and ongoing activities and to modify or halt operations causing serious harm to the environment.

BOEM's approach to post-lease activities described in the Second SEIS in Section 1.6, Postlease Processes and Activities provides background on the cautious approach under which activities proceed in order to ensure safety and environmental protection. A cornerstone to this approach is an extensive monitoring regime. The BOEM Environmental Studies Program conducts a number of baseline and on-going monitoring studies in the Chukchi Sea including the Chukchi Sea Offshore Monitoring in Drilling Area (COMIDA): Chemical and Benthos (AK-08-03), Hanna Shoal Ecosystem Study (AK-11-03), Population Assessment of Snow Crab, Chionoecetes opilio, in the Chukchi and Beaufort Seas Including Oil and Gas Lease Areas (AK-08-12-09), COMIDA: Impact Monitoring for Offshore Subsistence Hunting (AK-08-04), COMIDA: Distribution and Relative Abundance of Marine Mammals: Aerial Surveys (AK-08-02), and COMIDA: Passive Acoustic Detection and Monitoring of Endangered Whales in the Arctic (AK-09-02a). In addition, lease stipulations, BOEM operating regulations at 30 CFR 550, and monitoring requirements that are contained within Incidental Harassment Authorizations and Letters of Authorization issued by NMFS and USFWS, respectively, in accordance with the Marine Mammal Protection Act require operators to undertake extensive monitoring and reporting programs.

Larger coastal buffer. A 60-mile buffer is analyzed here under Alternative III – Corridor I deferral. The ramifications of selecting this alternative are analyzed in the Final Second SEIS. The Secretary retains discretion to vacate existing leases within this area as part of the Secretarial decision to affirm, modify, or vacate Lease Sale 193.

Deferrals. No additional deferral areas are examined as alternatives in the Final Second SEIS for the reason explained in Issue 4. Specific analysis of impacts from activities in or near important areas such as coastal water, Hanna Shoal, Herald Shoal, etc. is provided in the effects analysis and could be used to inform a decision supporting modification of the lease sale or project-specific mitigation measures going forward.

Scope of projects. The OCSLA requires plan-specific analysis of all proposed Exploration Plans and Development and Production Plans. BOEM will examine all feasible alternatives related to specific project sizes or technologies during its plan-specific reviews.

Pollution. The OCSLA requires plan-specific analysis of all proposed offshore oil and gas activities. BOEM will conduct further examination of issues related to pollution and resulting environmental impacts during its plan-specific reviews. Consistent with existing regulations, BOEM and BSEE impose substantive standards on pollution associated with activities they may authorize. Air emissions from OCS sources are regulated by BOEM. With respect to air emissions, BOEM regulates OCS sources and requires controls to be placed on any OCS source whose emissions would otherwise significantly affect onshore air quality. With respect to discharges into the ocean, BOEM and BSEE have authorities that supplement EPA's authority and regulations. EPA does not approve any discharge that would cause an unreasonable degradation of marine resources. Control of pollution from activities not authorized by BOEM is beyond BOEM's jurisdiction and outside the scope of this analysis.

Marine Mammals. BOEM considers potential impact to marine mammals and the appropriateness of mitigation measures in every plan-specific review it conducts. NMFS and USFWS also place a variety of marine mammals mitigation measures (such as requirement of MMOs/PSOs) in every incidental harassment authorization they issue. As explained in Appendix C and analyzed in Chapter 4, NMFA and USFWS typically require operators to utilize marine mammal observers as a condition of IHAs approvals for activities in the Chukchi Sea. Mitigation measures suggested through the SEIS process are noted and may be considered during project-specific reviews going forward.

Floating docks. The suggestion to require floating docks around drilling rigs to mimic ice floes to benefit wildlife is not considered a feasible recommendation for oil and gas activities in the Chukchi Sea. BOEM does not consider these devices to offer any safety advantages, either.

Subsistence. The subsistence section has been revised to better account for mitigation measures recommended in comments.

Icebreakers. Recommendations that industry pay for additional USCG icebreakers are beyond the scope of the SEIS and this measure would not serve to mitigate impacts identified in the SEIS.

Internalizing costs. BOEM regulations do not require companies, as a condition of plan approval, to submit a plan to internalize all costs, or to set up a trust fund for this purpose. This recommendation is beyond the scope of the SEIS.

Spill response and cleanup. Issue related to spill response and cleanup are administered and regulated by BSEE pursuant to its review of APDs. These issues are also addressed in detail in a separate Issue Category.

Bonds. Mechanisms for compensation due to oil spill impacts are provided for in BOEM regulations. BOEM administers a robust bonding program intended to ensure that operators are financially capable of addressing any environmental harms that might result from their activities. Proposed changes to these existing requirements are not deemed warranted at this time, nor are they within the scope of this analysis.

Revenue sharing. Mechanisms for revenue sharing could only be established through an act of Congress. No mandates are established through an EIS, which is an information document prepared pursuant to NEPA.

Other regulatory changes. The Final Second FEIS analyzes potential environmental effects as that could occur under the existing regulatory regime. Proposed changes to these regulations are beyond the scope of this analysis.

Access to information. BOEM administers a public information program under OCSLA and its implementing regulations. Proposed revisions to this program are beyond the scope of this analysis.

Pipeline routes. In the event that development is proposed, BOEM will review proposed pipeline corridors as part of its plan-specific review. BOEM will analyze potential environmental effects and, in concert with other relevant regulatory authorities, may consider requiring an alternate pipeline route at that time.

Issue 19. Responsibility to Arctic People and the Environment

Summary of Comments

The majority of comments referenced unique and special characteristics of the Arctic, a place one comment succinctly described as "home to iconic and irreplaceable wildlife and a thriving native culture."

Most of these comments describe that Chukchi Sea and North Slope environments using adjectives such as "fragile," "pure," and "pristine." The value of this environment – both intrinsic and as experienced by current and future generations – is asserted to outweigh any interest in development. Decisions affecting Arctic ecosystems and wildlife were often painted in moral terms.

Local residents' relationship with this environment was best described during public meetings. For example, BOEM heard testimony that:

> The animals, the ocean, the land, the air are intertwined. They cannot go without each other. If any disaster happened, it will ruin our garden. That's our garden. It provides

> everything for us: the natchiq, the nanuq, the ugruk, the agviq, which we treasure, which we treasure. And this is – this has been happening since time immemorial. And we want to keep it that way.

Broader cultural issues were also raised in public meetings, often through the lenses of Environmental Justice or human rights. For example, one resident asked, "How much money are human lives worth… How much money is Inupiat culture worth. What is the nutritional value of a U.S. dollar?"

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

BOEM takes its responsibilities of environmental stewardship seriously -- protecting the human, coastal, and marine environments. BOEM recognizes the importance of the Chukchi Sea and the environment and the interrelationship with the Iñupiat culture. In preparing the analysis in the Second SEIS, BOEM analysts paid particular attention to issues raised by Alaska Natives during the public hearings and government-to-government consultations.

The role of the Second SEIS is to identify and provide detailed analysis of potential environmental impacts, including potential impacts and risks to the Iñupiat people. Pertinent analysis is provided within the Environmental Justice, Sociocultural Systems, and Subsistence-Harvest Patterns. The Secretary of the Interior will weigh these impacts and risks when making the decision whether to affirm the lease sale.

Issue 20. Impacts on Subsistence-Harvest Patterns

Summary of Comments

Many comments generally alluded to impacts to subsistence-harvest patterns as a potential impact from oil and gas activities in the Chukchi Sea.

Meanwhile, subsistence was a primary subject matter in testimony received in public meetings held in Chukchi Sea villages. These comments communicated the central importance of subsistence activities to food security, health, family, community and culture. For instance:

- "The subsistence hunt of the bowhead whale is that most important subsistence activity for our people, both in terms of food security and for what it means culturally and spiritually to our community."
- "We are part of the ecosystem. Without them we can't live. Without them we cannot keep our people united."
- "We rely on subsistence, a way of life that has been passed to us for thousands of years. Without the animals, we wouldn't be here. Our food, our shelter, our clothing, our identity as a people that has been passed from one generation to another. I want my kids to continue that, my grandkids, their kids."

Several other comments at public meetings referenced the need for revenue streams and modern technology in order to continue effectively hunting (i.e., "the vast majority of people in this

community cannot afford to buy gas to go out hunting") with the caveat that subsistence resources must not be compromised. For example:

> …We grew up here. We were raised in a different time, you know, before all this energy came, and now we are depending on it. …We lived without oil, we lived without gas [and electricity and snowmachines]. …We know we can't go back to how it was, but we are concerned about the safety… of the animals. You know, they are who we are. They are our identity as a people, our food source.

BOEM also received other specific comments and proposed revisions concerning the Draft Second SEIS's description of subsistence-harvest patterns and its analysis of potential direct, indirect, and cumulative impacts to subsistence-harvest patterns.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

The central importance of subsistence-harvest activities to the people who live near the Leased Area is echoed throughout relevant portions of the SEIS. "Subsistence-harvest practices and patterns are fundamental to Alaska Native communities," it is explained in Section 4.3.11, "not only providing important food resources, but also forming the basis for core community values and social identify." BOEM's understanding of the importance of subsistence-harvest activities to communities along and near the Chukchi Sea is also reflected in the significance threshold applied to impacts to subsistence-harvest activities. This threshold – updated based on comments received in a prior NEPA process concerning Lease Sale 193 – provides that impacts to subsistence-harvest patterns are considered significant (i.e. "long-lasting and severe," or "major" under the Impacts Scale used in the SEIS) if they would disrupt subsistence activities, make subsistence resources unavailable or undesirable for use, or only available in greatly reduced numbers for a substantial portion of a subsistence season for any community.

The reader will notice that the Subsistence-Harvest Patterns analyses in Chapters 4 and 5 of the Final Second SEIS have undergone considerable review and revisions since the Draft stage. These revisions are intended to improve the organization of these sections, clarify and refine analyses, better account for relevant studies, and strengthen the link between the Subsistence analyses and the analyses of Sociocultural Systems, Public Health, and Environmental Justice. Specific revisions based on comments include updating the list of communities that harvests bowhead whales and characterization of where and when communities typically conduct their various harvests.

The high cost of fuel and other resources required for subsistence hunting in Chukchi Sea coastal communities is noted. Transportation fuel costs in the Northern Region of Alaska, including the communities of Point Hope and Kotzebue, are higher than most of the rest of the State and the U.S., ranging from $4.10 to $10.65 in July 2014 (Alaska Fuel Price Report, 2014, http://commerce.state.ak.us/dnn/Portals/4/pub/Fuel_Price_Report_Jul_2014.pdf). Affordability of fuel in rural communities will continue to be an important socioeconomic issue for the State going forward.

With respect to conflict avoidance mechanisms, existing BOEM regulations require mitigation of multiple-use conflicts, to include potential conflicts with subsistence-harvest activities. The regulations at 30 CFR § 550.202(d) and (e) state that proposed activities shall be conducted in a manner that does not unreasonably interfere with other uses of the OCS and does not cause an undue or serious harm to the human environment. the regulations at 30 CFR § 550.221(b) and 30 CFR § 550.223 require lease owners/operators to describe in their exploration plans how they will mitigate the potential for incidental takes to occur, monitor for potential takes, and report takes if they occur. Similar provisions apply to development and production plans at 30 CFR § 550.252(b) and 30 CFR 550.254. The regulations at 30 CFR § 550.227 and 30 CFR § 550.261 require lease owners/operators to provide information in their plans on how they will conduct their proposed activities in a manner consistent with the provisions of the MMPA and ESA.

BOEM cannot require operators to enter into CAAs because BOEM cannot require agreements between third parties. Similarly, the failure of any party to meet the provisions of a CAA is not enforceable by the Federal government. That said, operators remain free to enter into these agreements and, in certain circumstances, may cite such agreements when describing to BOEM how they will mitigate potential impacts to marine mammals and/or reduce the potential for interference with other uses of the OCS, i.e. subsistence-harvest activities.

Issue 21. Traditional Knowledge

Summary of Comments

Many commenters, particular those who attended public hearings in Chukchi Sea coastal communities, stressed the importance of Traditional knowledge and the need to incorporate it into government decision-making. It was stated that Traditional knowledge is "totally different" from Western science, "but they need to be looked at side by side…." Relative to Lease Sale 193, BOEM heard that:

> Decisions related to offshore oil and gas activities have to be based on the best available information, both Western science and traditional and contemporary local knowledge. In many cases, and we like to believe in all cases, the best available and most current reliable information is actually local knowledge.

Meanwhile, concerns were expressed as to the role of Traditional knowledge in light of climate change, i.e., "I'm glad you are respecting traditional knowledge, but the fact is as far as what we used to do and where we used to go hunting, years from now it's not going to be here, and you know why."

Comments advocated for the use of Traditional knowledge not only in government decision-making, but by industry as well, i.e., "Industry has been up here a long time, but they still don't get it. They should listen more and absorb some more traditional knowledge. Maybe then we can co-exist and do some responsible drilling up here."

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

BOEM appreciates that Alaska Natives possess a deep understanding of the land and sea that has made it possible for them to survive for thousands of years in one of the most challenging environments on Earth. Over the past 20 years, Traditional knowledge (TK) has become increasingly integrated with social, biological and physical scientific disciplines. Listening to indigenous perspectives and taking local knowledge into account are vital to achieving informed decision-making in ocean resource management. Although traditional and scientific knowledge may arise from different cultural traditions, they are compatible and allow for a powerful synergy when integrated appropriately. BOEM seeks to integrate TK into the NEPA process by using input received from three primary channels: the Environmental Studies Program (ESP), Government-to-Government consultations, and public testimony.

- BOEM actively expands the collection and use of TK through its ESP. The ESP designs, funds, and manages research efforts that are conducted through external Principle Investigators. Research strategies have evolved over the years, and different projects involved a wide variety of data collection efforts, including life history interviews, ethnographic fieldwork, workshops, focus groups, household surveys, community expert review panels, TK database construction, and collaborative wildlife tagging studies. Issue Category 2 provides additional information concerning BOEM's ESP.
- BOEM also engages Village and Regional tribes in its relevant decision-making processes. Government-to-Government consultation, coupled with more informal discussions between BOEM management and tribal leadership, provide invaluable insight that is considered and incorporated into agency decisions. In these conversations, tribal elders and leaders become our teachers, mentors, and coaches. Chapter 6 contains additional information regarding Government-to-Government consultation on Lease Sale 19.
- BOEM also gathers TK from local residents though testimony at public hearings in potentially affected communities. The Inupiat understand the high Arctic and the waters of the Chukchi Sea. Their traditions and knowledge result from ancestors living in and around these areas for thousands of years – and are kept alive through the shared experiences, counsels, and conversations of daily living. Chapter 6 provides additional information regarding public hearings on this Second SEIS.

Traditional knowledge derived through each of these channels has informed the NEPA documents and the decisions concerning Lease Sale 193 and related activities. For example, TK informed the Secretary's implementation of the 25 Statute Mile Buffer in the Final OCS Leasing Program for 2007-2012, the identification of larger coastal deferral corridors as Alternatives for analysis in the EIS, the revision of the significance threshold for impacts to subsistence-harvest patterns in the 2011 SEIS and this Final Second SEIS, and the imposition of late season drilling restrictions as a condition of approval of Shell's 2012 Chukchi Sea EP. BOEM remains committed to further improving its efforts to both accumulate TK and incorporate TK into its decision-making. BOEM also encourages prospective operators to do likewise.

Issue 22. Other Social Impacts

Summary of Comments

Many comments –most notably comments provided at public meeting in coastal villages near the Leased Area – concerned impacts to other social issues, including sociocultural systems, public health, and Environmental Justice.

BOEM heard many comments describing the sociocultural systems of potentially affected villages. Many of these comments described the aforementioned importance of subsistence to the well-being

and culture of these communities. Some of these comments emphasized issues of food security: "We cannot buy the whales. We cannot buy the ugruk. We cannot even sell it right now. How can they expect us to take care of ourselves should catastrophe happen in our ocean?" Food security issues were identified as an especially important issue given high unemployment in villages and residents' reliance on traditional foods that could be put at risk by drilling. BOEM was asked rhetorically how, in the event of an oil spill, the government could assess the damage to [Inupiat] culture. The larger ramifications of these concerns to the social structures of community were also explained: "We are part of the ecosystem. Without [subsistence resources] we can't live. Without them we cannot keep our people united." Meanwhile, other comments stated that "at this time, oil development is a big part of our future" and focused on ensuring that activities are conducted responsibly, that the risks expressed above are mitigated, and that benefits are shared with affected communities.

Testimony at these public meetings characterized the prospect of offshore oil and gas activities, and the attendant risks and rewards, as a divisive issue within local communities. Some commenters described the difficult position in which communities are placed due to proposed oil and gas development and associated pro- and anti-development sentiment both locally and nationally: "The rifts in our communities," it was stated, "created an opportunity to outside interests to prevail and try to speak for us, represent us and use us."

The potential influx of oil and gas workers into these small communities was also a concern. In reference to recent activities conducted on the OCS but largely supported from nearby villages, it was stated that a lot of people are coming to the village and taking up resources, stressing finite local services and infrastructure. BOEM was asked to consider the impact of worker and support staff housing on communities. Less tangible, but equally notable, effects from the presence of outsiders employed through existing onshore production activities at Prudhoe Bay were also identified as illustrative of potential impacts from potential offshore activities: "There are very few local people employed at Prudhoe Bay, and the people employed there do not like their jobs. The unhappiness factor of people that are here solely for money negatively affects us here."

Several comments focused on issues concerning public health. Some asserted a lack of analysis in the Draft Second SEIS concerning potential impacts to health (manifested in large part via potential impacts to subsistence harvests) associated with the Proposed Action. BOEM was requested to complete a human health analysis for all offshore oil and gas projects that have the potential to affect the health of communities. One commenter stated that a lot of research indicates oil and gas activities have negative impacts on human health; onshore development at Prudhoe Bay was cited as the cause of increased health problems on the North Slope. A comment requested that BOEM work with local governments to recognize and address any appropriate mitigation measures available to reduce potential health effects of any proposed action on the OCS.

Stress on community members was also a frequently-cited concern at public meeting in Chukchi Sea villages. Residents explained that with so many things happening on the North Slope, residents are experiencing a huge amount of stress, which may impacts people's health. Young people in particular were noted as particularly vulnerable to mental health problems due to stress brought on by potential oil and gas development, not only in terms of potential environmental harm, but also in terms of the choices presented by competing ways of life: "We have those two forces going against each other. Should I go hunting or should I go to school? That kind of stress is going on in their young people's minds."

One comment requested that the SEIS should propose protections for public health, similar to the mitigation identified in BLM's NPR-A EIS, for onshore operations that may cause an influx of outside workers or otherwise expose community members to communicable diseases. A potential increase in field crews and oil workers conducting land-based operations again raised issues of strain on infrastructure as workers utilize the health system due to illness or injuries. It was suggested that

potential operators outline in a health plan how they will treat ill or injured personnel in a manner that reduces reliance on local health services. Increased burdens on health care systems would also arise in the event of an oil spill, a commenter worried.

Finally, several comments raised the issue of Environmental Justice. Many of these comments focused on adverse impacts to subsistence and adverse impacts from an oil spill. The implications of spill events to sociocultural systems and public health were also asserted to have a disproportionate impact on lower income families in NSB communities. Oil and gas activities more generally were stated to cause disruption to the social and civil fabric of communities. These comments largely asserted the perspective that "…the coastal communities of the Chukchi Sea would assume the risk of changes to our oceans and sustenance through drilling, but would not receive any of the benefits." Meanwhile, several comments asserted that disproportionate impacts to the Inupiat people from activities such as the Proposed Action warranted a human rights assessment. BOEM perceived a prevailing sentiment that if oil and gas activities were to occur, then government and lessees should ensure that local communities share not only the risks, but also the benefits. It was stated that companies that want to profit off the oil should also make sure that communities get some benefit, for instance jobs, affordable energy, and funding for local schools, clinics, and search and rescue services.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- General Public

Response to Comments

Impacts to sociocultural systems are analyzed in Sections 4.3.12, 4.5.12, and 5.2.11. Impacts to public health are analyzed in Sections 4.3.13, 4.5.13, and 5.2.12. The types of potential impacts described above are addressed in those analyses. The suggestion for a human health assessment for offshore oil and gas development has been added to the Public Health section as a potential mitigation measure. A potential mitigation measure concerning working with local authorities to mitigate public health concerns has also been incorporated. Suggested mitigation measures related to the influx of outside workers and will also be taken into consideration during reviews of specific plans of operation. Quantifying costs associated with the personal health of certain community members, however, is beyond the scope of this analysis.

Environmental Justice concerns are analyzed in Sections 4.3.14, 4.5.13, and 5.2.13. The potential for disproportionate effects of the nature described in comments summarized above are acknowledged and addressed in those sections. Text in the Environmental Justice section has been modified to reflect impacts indicated in Subsistence, which determined impacts would be moderate to major. It is inaccurate to state, however, that the residents of the North Slope would receive no benefit from activities described in the Scenario. The coastal communities of the Chukchi Sea would experience socioeconomic benefits from Lease Sale 193 activities in the form of direct and indirect employment and income, as well as property tax revenues accruing to local government. See section 4.3.10.1 for further discussion of local benefits.

Issues related to oil-spill responses are appropriately reviewed by BSEE with respect to specific spill response plans to be submitted with any exploration or development and production plans that may be proposed; tailored, plan-specific mitigations may developed during such reviews.

Issue 23. Cumulative Impacts

Summary of Comments

Several comments expressed concern about cumulative impacts to various resources areas from actions such as increased climate change, ocean acidification, vessel traffic, diminishment of sea ice, military activities, and other oil and gas development. Some comments requested additional clarity on how analysts reached their cumulative effects determinations and suggested that the SEIS better articulate a connection between the list of activities and the conclusions.

Northwest Passage. The Final Second FEIS should address the impacts (such as risk of collisions, secondary impacts to water quality and biological resources) associated with the development of Lease Sale 193 on the increasing shipping activities through the Northwest Passage.

Methane Hydrates. Development and production of methane hydrates along the Alaska North Slope may constitute a reasonably foreseeable action.

Concerned about cumulative impacts from military activities and field dust from oil.

Oil Spills. Very Large Spills, though analyzed in the VLOS analyses, are not part of the Scenario. The largest spill in the Scenario is a 5,100 bbl spill from a production platform. Another large pipeline spill of 1,700 bbl is also anticipated. The remaining spills are small and would produce negligible effects on cetaceans and seals. For these reasons, only large and small spills are included in species-specific analyses for cetaceans and seals. Due to the small size of the small spills and the limited nature of 1 large platform spill (5,100 bbl) and 1 large pipeline spill (1,700 bbl), there should be no long-lasting cumulative impacts to cetaceans and seals from oil spills over the 77 years of the Scenario.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- General Public

Response to Comments

Analytical framework. The Final Second FEIS describes its framework for analyzing cumulative impacts, along with other relevant, reasonably foreseeable actions (aside from the Proposed Action), within Section 5.1. It is explained that the cumulative effects analysis considers additive, countervailing, and synergistic impacts. The multi-step framework for the analysis includes:

- Summarizing potential effects resulting from the Proposed Action and other alternatives, on the marine, coastal, and human environments;
- Identifying other past, present, and reasonably foreseeable future actions and their effects on the marine, coastal, and human environments; and
- Determining the incremental contribution of the Proposed Action, and other alternatives, to the cumulative case.

The SEIS specifically considers a host of other past, present and reasonably foreseeable future actions, including but not limited to:

- Oil and gas activities
- Community development
- Recreation and tourism

- Marine vessel traffic
- Aircraft traffic
- Subsistence activities
- Research and survey activities
- Mining project
- Military/Homeland Security activities.

While not "activities" in the strict sense of the word, the SEIS also considered climate change and its associated effect, to include warming temperatures, diminished seasonal sea ice, and ocean acidification. AMAP (2013) referenced in Section 3.1.6 subsection Ocean Acidification provides further details on increasing CO_2. Why CO_2 is increasing is not essential to the impact assessment. The important impact factor is that it is increasing and the Section 3.1.6 subsection Ocean Acidification appropriately discusses the factors causing the amplification of ocean acidification in the Arctic.

With respect to methane hydrates, there is no evidence of ice-bearing permafrost on the continental shelf in the Chukchi Sea Planning Area based on an analysis of seismic reflection velocity data. Without permafrost, gas hydrates will not be stable on the continental shelf. Therefore, gas hydrate production on the shelf is not possible. Gas hydrates are likely to be present on the lower continental slope and rise (Kvenvolden and Grantz, 1990; Andreassen et al., 1995), but the thickness of the hydrate zone is likely to be only a few 10's of meters and the underlying free gas is expected to have a saturation of less than 10%. It is highly unlikely that such minor accumulations would ever be produced because the energy required for production would likely exceed the energy contained in the produced resource.

Issue 24. Risks of Oil and Gas Development

Summary of Comments

Many comment spoke broadly to general risks associated with offshore oil and gas exploration, development, and production.

Many comments spoke positively of operators' ability to proceed responsibly and safely. It was asserted that these companies have the resources, technology, and expertise to develop Chukchi Sea oil and gas safely. "These tremendous energy resources," it was stated, "are vital for securing America's energy future and these environmental reviews establish that they can be produced safely." Many of these comments pointed to the track record and circumstances of drilling on the Arctic OCS to substantiate this view, for example:

> Since 1974, 84 wells have been drilled in the Alaska OCSS – all without incident. For drilling planned in the Chukchi Sea, the water depth is rather shallow – several hundred feet – and is akin to the near-shore shallow-water Gulf of Mexico, where safe drilling practices have led to a long history of sage operations.

Many other comments took the opposite view. In addition to comments on the inherent risks of even routine oil and gas activities, it was stated there is no technology that will allow an oil drilling platform to remain absolutely fixed in the face of massive Arctic storms and ice floes, and there is no technology that can prevent a rupture of the well. One public meeting attendee stated that "I am pro-development when it's clearly safe but drilling in the Arctic is not feasible at this time with the current technologies." Other comments characterized analysis in the Draft Second SEIS as proof that oil spills are inevitable and will cause serious effects. Current events were cited to reinforce this point, including mishaps associated with Shell's 2012 drilling season, and an unmanned barge

carrying 950 gallons of diesel fuel is drifting in the Arctic Ocean after it broke loose from its tug during a severe storm.

Many commenters expressed the opinion that the risk of an oil spill is too high to consider moving forward with Lease Sale 193.

- BOEM's acknowledgement of the high risk of major oil spills in Arctic waters raises fundamental questions about the harm BOEM is willing to accept to the environment, local communities, and the United States to advance a drilling program in U.S. Arctic waters.
- A 75% chance of a major oil spill -- and even a 10% chance – is way too much for the environment and the people to handle.
- With the high chance of an oil spill, which in the [USDOI] department's words would cause "substantial injury and mortality" to beluga whales and seals, you have a moral obligation to stop Lease Sale 193.
- Spills, massive spills, will occur.
- It is not possible to drill safely in the arctic and too many species are at risk.
- BOEM's analysis on oil spill probability proves such events are very significant.

One public meeting attendee offered Traditional knowledge to substantiate the inevitability of an oil spill, explaining"…in our history, in our stories they say there will be black ice coming from the north. What is that? That's oil coming from the north. Instead of ice it will be oil. It will be a disaster. We don't want that to happen."

It was also states that the evidence is clear that drilling in the Arctic is already causing serious harm, and that 100% assurances about safety are required before drilling could or should be allowed.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

BOEM understands that the potential risks of offshore oil and gas development must be analyzed, disclosed, and considered prior to authorizing activities on the OCS. To this end, the OCS Lands Act creates an opportunity to analyze, disclose and consider potential risks at four distinct decision points for OCS oil and gas activities: the Five-Year Program, the lease sale phase, the Exploration Plan phase, and the Development and Production Plan phase.

This Final Second SEIS analyzes the potential environmental impacts of a decision at the lease sale phase. The SEIS also takes a hard look at potential impacts from numerous impacting factors associated with OCS oil at later OSCLA phases, i.e., exploration, development, and production. The analyses provide BOEM's and DOI's decision makers with an objective appraisal of the severity of potential impacts during each of these phases. In addition, the SEIS provides the decision makers and the public with a scenario of the types and levels of activities that may result from Lease Sale 193, as well as a discussion of the history and probability of various sizes of oil spill events. The SEIS also includes a discussion of spill response and cleanup. All of this information is provided to BOEM and

DOI decision makers to enable informed decisions that balance the need for domestic oil and gas production, the potential effects of OCS activities, and the mandate to protect sensitive environmental resources. No decisions are made in the SEIS. The decisions on Lease Sale 193 will be made by the Secretary of the Interior.

Issue 25. Oil Spill Probability

Summary of Comments

Many comments state that oil spills, including large spills, are inevitable.

One comment provided an extensive critique of the Fault Tree analysis that helped BOEM estimate an oil spill rate for the activities assumed in the Scenario. More specifically, this comment states that:

- The Draft Second SEIS does not sufficiently consider ice gouging, in that that scour depth used in the Fault Tree analysis does not account for ice scour depths reported in the Chukchi Sea.
- Assumptions concerning ice buckling should be made without regard to strudel scour and should account for the entire pipeline length.
- The Fault Tree analysis should consider risks associated with tectonic events.
- The Fault Tree analysis should consider the likelihood of current-induced shifting of surface sediments.
- The Fault Tree analysis assumes an erroneously low level of maritime traffic and does not adequately account for adverse environmental conditions such as ice, fog, snow, and darkness.
- There is a discrepancy in data presented in the SEIS and a prior Report on updates to the Fault Tree.
- The Fault Tree analysis does not consider risks associated with constructing a gas pipeline in proximity to the existing oil pipeline.
- The potential for earthquakes and tsunamis should be considered in oil spill risk assessments.
- There is a discrepancy between the following: the 44 years used in developing large oil spill rates; the 51 year period of oil exploration, development, and production; and the 77-year duration of the Scenario.

One comment requested an estimate of the probability of a large spill during exploration.

One comment requested that BOEM clarify the parameters used in its datasets for estimating the probability of oil spills in the Exploration Phase.

Finally, one comment stated that oil spill datasets are seriously flawed due to underreporting.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

BOEM strives to use the best available information in our oil spill analysis and has invested considerable time, effort, and funding in the past few years to improve our oil spill analysis in the Arctic (Bercha Group, 2013; Bercha Group 2014a, b; Nuka 2013).

BOEM conducted a rigorous analysis of the probability of one or more large crude oil spills occurring. BOEM did not shorten the estimated project life nor were the spill rates underestimated. Various phases occur through time and each activity phase through time was considered for spill size and spill type in the analysis of oil spills and their impacts on resources. Section 4.1.2.5, Table 4-4 shows the generalized size, type, and timing of small and large spills for Year 1 through Year 77, and the text within Section 4.1.2.5 and Appendix A, Sections A-4 and A-5 discuss how these were derived.

BOEM did not base the analysis only on the historical data of the mean number of spills that have occurred during other OCS operations. For the Second SEIS, BOEM completed an Update to the Fault Tree Methodology and Technology for Risk Analysis Chukchi Sea Sale 193 Leased Area (Bercha Group, 2014b). Appendix A, Section 4.1.1. discusses the fault tree modeling and the derivation of the large spill rate. Using fault trees, oil-spill data from the Gulf of Mexico and Pacific OCS (Bercha Group Inc., 2013) were modified and incremented to represent expected Arctic performance and included both Arctic and non-Arctic variability. BOEM accounted for numerous environmental and engineering variables within the Fault Tree (Bercha Group, 2014b; Chapter 2 pages 2.1-10 and Chapter 4 pages 4.1 through 4.19). The effects of the Arctic environment and operations are reflected in the effect on facility and pipeline failure rates in two ways; through "Modified Effects", those changing the frequency component of certain fault contributions such as anchor impacts which are common to both Arctic and temperate zones, and through "Unique Effects," additive elements such as ice gouging which are unique to the Arctic offshore environment.

The Bercha Group (2014b) does not include a detailed engineering analysis of strudel scour, upheaval buckling, and ice gouging. The work did not analyze specific data sets because they do not exist for the Leased Area as a whole. Such data is available for site specific areas and would be available after leasing when development plans are submitted and would be incorporated in the oil-spill risk analysis for evaluation of a proposed development project. Such data sets are therefore not essential for a reasoned choice among alternatives in this lease sale EIS. For the Second SEIS analysis, Bercha Group Inc. (2014b) used credible results of analyses and previously established gouge-pipeline failure models as a basis for the inputs to the analysis. Although it is relatively easy to calculate a failure probability for a specific case, given the engineering, operational, geotechnical, and thermodynamic parameters, to predict their distribution and timing throughout the study area and life cycle is beyond the scope of a fault tree analysis for a lease sale. BOEM/BSEE anticipates funding additional proposals for this type of work. The data would be available for incorporation into the EIS for any development proposal resulting from Lease Sale 193 and a subsequent discovery.

The fault tree model appropriately covered a range of ice gouge distributions. Ice gouging was modeled as an exponential failure distribution and not a single mean scour depth in the fault tree model. In support of a development proposal, detailed high-resolution seismic surveys are conducted to determine the distribution of gouging and the gouging characteristics. Based on such site-specific data, mitigation measures such as extra-thick walled pipelines, pipeline burial depths more than twice the maximum 100-year ice-gouging event, and advanced leak detection systems were designed for the Northstar and Liberty developments. These measures reduce the likelihood of an oil spill and support detection of very small volumes of oil and limit the size of potential chronic leaks to about 100 bbl.

Upheaval bucking and strudel scour are related. Upheaval buckling of a pipeline is the instability of a pipe that results from excessive axial compressive force in the pipe. If there is not enough vertical downward force on the pipe to resist the instability, vertical motion of the pipe occurs. Once an

upheaval buckle begins and the pipeline starts to move upwards out of the trench, the axial force from thermal expansion of the pipeline is relieved. As the pipeline continues to expand, it feeds into the buckle. The removal of sediment through strudel scour can cause upheaval buckling. Overburden fill material prevents upheaval buckling by applying a vertical downward force.

The SEIS assumes that buried offshore pipelines will bring oil ashore, based on current offshore engineering in the U.S. Beaufort Sea and other factors analyzed in Chapter 2 of the Second SEIS. Engineering studies indicate that a key consideration in the design of buried offshore pipelines in an arctic environment is the optimum burial depths that maximize the pipeline's safety from rupture by ice gouging and minimize costs. The problem of ice gouging has been investigated to considerable extent, and burial depths that will minimize the probability of scour can be specified and known using existing engineering criteria. Continuous monitoring techniques will enable the operators of such pipelines to be forewarned of potential ice gouge problems and to take corrective actions. Even if a discovery is made in the near future in the Chukchi Sea, production will likely not occur for 12 to 15 years. With such a lead period, production and transportation problems can be adequately resolved.

While the fault tree model does not explicitly have causal factors such as tectonic forces or migrating bedforms, the category of "other" is included to reflect oil-spill causal factors that have not occurred in the Gulf of Mexico or Pacific OCS. Oil production in tectonically active areas such as the California OCS and Cook Inlet state waters have been occurring for over forty years and tectonic factors are considered in the design and engineering phases of the development to preclude oil spills. No spills due to earthquakes have occurred to date.

Table 4.7 in Bercha (2014b) shows that the expected frequency change for collision is 40%. The distribution ranges from a reduction of 10 to 60 percent. The Fault Tree models Arctic effect parameters are distributions used in Monte Carlo simulations, not single point expected values.

Seasonal ice will likely still occur in the Arctic from December through June thereby limiting vessel traffic for approximately 6-8 months a year. Khon et al. (2010) used a subset of climate models that better reproduce observed sea ice dynamics than other general circulation models to project the duration of the navigation season along the Northern Sea Route (NSR) and through the North West Passage (NWP). According to their results, by the end of the 21st century, the NSR may be open for navigation 4.5 ± 1.3 months per year, while the NWP may be open 2 to 4 months per year (Larsen et al., 2014, Figure 28-4 page 1592). The models did not predict any significant changes of the ice conditions in the NWP until the early 2030s. It should also be noted that Arctic shipping will not linearly increase; in 2014, there was a significant reduction in shipping traffic in the NSR.

Relative to the Gulf of Mexico port calls (an indicator for ship traffic density), which represent approximately 32 percent of total U.S. port calls, the Arctic will have very low traffic density. Trends for GOM port calls relative to total U.S. port calls shows an approximate 3 percent average increase of GOM port calls over the last decade, from 17,673 in 2002 to 22,989 in 2011 (USDOT, MARAD, 2013a). It is expected that the usage of Gulf of Mexico ports will continue to increase by approximately 3 percent annually over the next 40 years. As such, it is anticipated that port calls by all ship types will be bounded annually by a lower limit of current use and an upper limit of approximately 85,000 vessel port calls (USDOI, BOEM 2014). Relative to the Gulf of Mexico OCS traffic based on port calls, the reduction in 40% of Arctic ship traffic and collision rates is reasonable.

The commenter has misinterpreted the frequency of thaw settlement versus the frequency of failure from thaw settlement in the report Updates to Fault Tree Methodology and Technology for Risk Analysis – Chukchi Sea Sale 193 Lease Area. Section 2.5.5 Thaw Settlement of the 2014 report states that the occurrence of thaw settlement is conservatively taken at 50% of the probability of strudel. Section 2.5.5 discusses the rate of thaw settlement while Table 4.4 shows the failure frequency resulting from thaw settlement.

Approximately 111,000 lines miles of marine seismic reflection data that have been collected in the Chukchi Sea Planning Area provide an excellent framework for understanding the geology and geophysics. The report the commenter's cite estimate the risk of a tsunami to be "very low" based on an absence of historical occurrences in addition to the low seismogenic potential of the area.

There is no historical evidence to support that constructing pipelines increases the frequency of damage to pipelines. The Gulf of Mexico OCS has over 35,000 km of oil and gas pipelines installed since the 1940s. No large oil spills have occurred from pipeline installation damaging other pipelines.

The basis for using a Poisson process for determining the probability of spill occurrence is found within the peer-reviewed literature. Anderson, Mayes, and LaBelle (2012) is the fifth of a series of independently peer-reviewed papers presented in support of oil-spill-rate assumptions used for oil-spill-occurrence estimates, with three earlier Anderson and LaBelle efforts (2000, 1994, 1990) and Lanfear and Amstutz (1983). The Lanfear and Amstutz (1983) report examines the cumulative frequency distributions of oil spills, tests pipeline miles as an alternative exposure variable for pipeline spills, and discusses the trend analysis of offshore spills performed by Nakassis (1982). These spill-rate papers tier off earlier work performed by the USDOI in support of the Oil-Spill-Risk Analysis (OSRA) model, and work performed by other oil-spill researchers, as referenced in the papers.

The Smith et al. (1982) report documents the fundamentals of the DOI's OSRA Model. It describes the approach of using lambda, the unknown spill-occurrence rate for a fixed class of spills, as a parameter in a Poisson process, with volume of oil handled as an exposure variable to predict the probability of spill occurrence (Smith et al., 1982:18-24). A Bayesian methodology, described in detail in Appendix A of Smith et al. (1982), Distribution Theory of Spill Incidence, provides one way to weight the different possible values of lambda given the past frequency of spill occurrence for a fixed class of spills. Smith et al. (1982) selects volume as an exposure variable in that it is a quantity that would be more practical to estimate future exposure (a necessity for using it to forecast future spill occurrence) than the other exposure variables considered.

In support of using the Poisson process for spill occurrence and examinations of different exposure variables, Smith et al. (1982) references the works of Devanney and Stewart (1974), Stewart (1976), and Stewart and Kennedy (1978). These references, and other pertinent ones, can be found at Oil Spill Rates – Additional references are available through BOEM's website at http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/Oil-Spill-Modeling/Oil-Spill-Occurence-Rate-for-Oil-Spill-Risk-Analysis-(OSRA).aspx.

Issue 26. Oil Spill Trajectory Modeling

Summary of Comments

Several comments provided opinions as to where spilled oil would go, in the event that a spill occurs.

- If there is an oil spill, once the ice breaks up, the ice will act like a sponge and spread the oil all over.
- Oil spills in the Arctic will drift down the west coast off Canada creating an international spill as well as drifting down into Washington waters
- Spilled oil will come directly to our coastline if an oil spill actually happens.

Other comments critiqued BOEM's oil spill trajectory modeling methods, i.e., the OSRA model. These comments asserted faults and limitations concerning the OSRA model and proposed that BOEM use other specific models asserted to be superior at predicted where spilled oil would travel. The following is a list of identified information:

- BOEM's oil spill analysis is not stochastic.

- OSRA is the same modeling technique used since the 1980s without much change and failed to account for new information.
- OSRA only considers surface trajectories.
- OSRA assumes oil is a point and stops when it contacts the coast.
- OSRA fails to account for weathering.
- The reliance on post-lease information affects BOEM's trajectory analysis of an oil spill.
- Accounting for the consequences of climate change on the OSRA model.
- BOEM did not include special areas warranting protection or important marine and coastal bird resources in the OSRA model.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

- The DOI Oil Spill Risk Analysis (OSRA) model was specifically developed to provide the information to the Environmental Impact Statement (EIS) that is the basis that the Secretary of the Interior uses to make decisions about OCS Lease Sales. The purpose of BOEM's oil-spill trajectory modeling analysis for this Second SEIS is to provide information for various factors regarding oil spills to assess the oil spill impacts from an oil and gas lease sale over the life of exploration, development, production and decommissioning. Extensive quantification has been applied to oil spills (Section 4.1.2.5 and Appendix A) for the specific purpose of impact assessment.
- To be useful, the OSRA model results must characterize the entire Leased Area. Some generalizations are required, considering initially that the leases have not been let, and many of the numbers and properties of the wells and the oil properties are not known with certainty. Rather than focus on one specific location and making assumptions about the oil properties, the OSRA is "stochastic". The OSRA has many release points (375) within the lease sale and adjacent area to define the overall trajectory population (3,240 from each point) for a total of 1.215 million simulated trajectories. For the oil properties, the OSRA model trajectory calculation assumes a non-weathering oil, which is assumed to be a conservative choice. The specifics of one or more appropriate oils for weathering estimates are described in the Second SEIS Appendix A, Section A-2.4 and Tables A.1-4 through 8.
- The OSRA model algorithms have been improved many times since the original development (Ji 2004; Price et al, 2003, Price et al., 2004). Considerable effort (funding) has been expended to improve the results of OSRA by improving the wind, ocean current and sea ice motion estimates. The studies have focused on obtaining the best ocean circulation and ice information available, and as computers and ocean models improve, the results of the calculations have become more realistic and the quality of output has drastically increased (Curchitser et al. 2013). The increased spatial resolution of ocean models has also greatly increased the quality of output used in the trajectory calculations. In performing the trajectory calculations, OSRA uses gridded fields of the wind, ocean currents and ice motion vectors, interpolated to the center of mass of the individual

trajectory. BOEM calculates a large numbers of trajectories (3,240) from a large number of spill release points (375) to derive the statistics used to represent the overall probability of contact from a lease sale area to environmental resources.

- BOEM receives input from stakeholders and employs internal staff subject matter experts to describe the most appropriate description of the at-sea resources (that is, environmental resources, such as marine mammal migration routes or subsistence areas). These environmental resources include 124 offshore biologic, social, and economically sensitive offshore and onshore environmental resources areas, 133 land segments, 46 grouped land segments, and 40 boundary segments (Appendix A, Sections A-3.1-3 and A-3.1-4).These resources then have a conditional probability of being contacted by hypothetical large or very large oil spills. Furthermore, the OSRA process calculates a combined probability of spill occurrence and contact to these resources for the Federal action, i.e. the Lease Sale.
- The conditional probabilities that a large or very large oil spill starting at a particular location (launch areas or pipelines) will contact a certain environmental resource are estimated for three seasons (annual, summer, and winter) and six time periods (3, 10, 30, 60, 180, and 360 days), and the combined probabilities of both oil-spill occurrence and oil-spill contact are estimated annually for the same time intervals. Those estimated probabilities are presented in 75 tables in the Section A.2. of Appendix A. Subject matter experts use this information to estimate the impacts from large or very large spills for up to 15 resource categories discussed in Sections 4.3, 4.4, or 5.2 of the Second SEIS. The OSRA provides a wealth of information for the subject matter experts to use in the form of tables (Appendix A, Sections A.1 and A.2) and illustrations (Appendix A, Maps) to make a reasoned assessment of the impacts of large or very large oil spills over the life of the Proposed Action and alternatives for individual resource categories in the Second SEIS.
- Some commenters suggest the BOEM should utilize the GNOME (General NOAA Operational Modeling), SIMAP, or Australia's Oil Spill Trajectory Model. Depending on the questions asked various modeling exercises can produce different results that are useful for a particular situation. One organization's application of a particular oil-spill trajectory model does not invalidate another for its intended purpose.
- BOEM did in fact consider and used the information in the Second SEIS analysis from the SIMAP modeling in the Canadian Beaufort Sea. BOEM identified Oil and Gas Activities in Russia and Canada in Section 5.2 and included results from Gearon et al. (2014) in its discussion and analysis of cumulative oil and gas activities in the Draft Second SEIS. For example, "Gearon, et al. (2014) modelled the spread oil spills originating in the Eastern Beaufort Sea, and found that oil from a theoretical 5.4 million bbl well blowout could contact some Beaufort and Chukchi Sea nearshore areas."
- Appendix A, Section A-3 and Li, Johnson, and Murphy (2015) provide detailed information about the OSRA model and its underlying components; all of which are the best available information and the most appropriate for the lease sale stochastic oil spill trajectory analysis. The OSRA model is not a dated model nor is it a climatological model using monthly averages at large scale. The OSRA model is a component model in which the underlying components are continuously updated with the best available new information. Li Johnson, and Murphy (2015) and Appendix A, Sections A.3.1 through 7 describe the OSRA model components. Curchitser et al., (2013) completed a state-of-the-art high resolution (5km) coupled ocean sea-ice model, which was specifically designed for running the OSRA model in the Chukchi and Beaufort Seas area, to simulate several decades of the currents in the Chukchi and Beaufort Seas. The model was setup regionally for the Arctic with enhanced resolution (5 km) in the Chukchi and Beaufort seas. The coupled ocean sea-ice model has the capability to reproduce the coastal hydrodynamic

features and generate the landfast ice coverage. The model skill is extensively verified with the most recent field and satellite observation data in these areas, some of which is also funded by BOEM, such as the mooring records from University of Alaska Fairbanks (UAF) and University of Washington (UW) field campaigns during 1990–1996 in the Chukchi Sea and 1999–2006 in the Beaufort Sea, satellite-tracked drifters deployed in the Chukchi Sea during the 2011 and 2012 summer months (Curchitser et al., 2013, Chapter 3). The coupled ocean sea-ice model used observed daily or bi-daily remotely sensed ice concentration data from the National Snow and Ice Data Center (NSIDC) archives of the passive microwave SSM/I satellite measurements for the entire model integration period. BOEM also used an independent Modeling Review Board to review and assess the results of this coupled ocean sea-ice model prior to its use in this Arctic OSRA model run.

- In contrast Gearon et al. (2014) used the TOPAZ4 currents and ice data to run its SIMAP model that could not resolve the coastal hydrodynamic features, especially the eastward flowing shelf counter current (p. iv of executive summary in Gearon et al., 2014). The resolution of TOPAZ4 is approximately 12-16 km spacing, which is "too coarse to properly resolve all of the mesoscale variability in the Arctic, where the Rossby radius is as small as 1-2km" (Sakov et al. 2012, p. 635). The TOPAZ4 only uses the monthly ice coverage to verify its model output. The ERA-40 wind data in Gearon et al. (2014) has a resolution of 40 km which is very coarse for use in the oil spill trajectory estimates. The monthly landfast ice coverage data used in Gearon et al. (2014) for oil spill trajectory estimates cannot capture the daily variation.
- Relevant updated information on environmental resources was also used (Appendix A, Tables A.1-10 through 19). BOEM included special areas warranting protection in the oil spill trajectory analysis and considered the results in the both the large and very large oil spill analysis. Appendix A shows that Hanna Shoal, Herald Shoal, Chukchi Corridor coastal buffer, and Barrow Canyon are represented by various ERAs. Hanna Shoal is represented by ERA 6 (Map A-2a), ERA 56 (Map A-2b) and ERA 47 (Map A-2c). Herald Shoal is represented by ERA 62 (Map A-2a). The Chukchi Corridor contains numerous ERAs including ERAs 51 and 40 (Map A-2a), ERAs 10, 61, and 108 (Map A-2b), ERAs 48, 39 and 41 (Map A-2c). Barrow Canyon is represented by ERAs 16, 7 and 30 (Map A-2d) and ERA 119 (Map A-2e).
- BOEM did not receive any comments on the 2007 FEIS nor the 2010 SEIS nor during the Notice of Intent to prepare a Second SEIS indicating any deficiencies in its Marine and Coastal Bird ERAs nor providing new information for BOEM's review and consideration prior to the OSRA model run. Appendix A, Table A.1-10 contains ERAs specific to Marine and Coastal birds with contain seabird nesting colonies and foraging areas. BOEM reviewed available information on seabird colonies and important bird areas maps suggested and the areas are generally similar although the shapes and sizes are different. The largest seabird colonies (ERAs 14 and 15) are buffered by 40 kilometers and all the barrier islands are buffered to include foraging areas. Tables A.1-11 through A.1-19 also contain resources that can be used to represent marine and coastal bird areas. Seabird colonies are represented by individual land segments along the coast. Collectively these ERAs and LSs provide sufficient information for subject matter experts to make reasoned oil spill analyses and enable the decision-maker to consider fully the environmental impact factors involved at the lease sale stage. BOEM is always open to improving its analyses and looks forward to updating its input on marine and coastal birds.
- New shoreline environmental sensitivity index data obtained from Harper and Morris (2014) were also correlated to the land and grouped land segments (Appendix A, Table A.1-3). A collection of trajectories representing a large or very large spill can contact multiple land segments and not a single land segment as commenters suggest. Although a

trajectory stops after contacting a land segment, the length of the land segments (average 20 km) provide a conservative estimate of oil contacting shore, particularly with the low tidal elevation (10 cm) along the Chukchi Sea. The agency has reviewed the state of the art on modeling interactions between spilled oil and shorelines for the development of algorithms for oil spill risk analysis modeling (Schmidt-Etkin, McCay, and Michel, 2007). One conclusion the report reached was that "Despite the large body of published research on shoreline oiling, there remain significant information gaps with regard to the dynamic processes involved in shoreline oiling even over the relative short-term that would be most directly and practically applicable to oil spill risk analysis modeling."

- Launch areas were considered that contained or were adjacent to the existing leases or hypothetical pipelines that serviced launch areas with leases. The Program Area for the Proposed Action is coextensive with the Area Identification used for environmental analysis in the 2007 FEIS and 2011 FSEIS.
- The OSRA model appropriately considered a surface release. Appendix A, Section A-7.2.1 discusses an oil spill from shallow to moderate depths that would be expected to surface rapidly within a short distance from the subsurface release point. EmergeWest Consulting (2014) shows the same modeling results. The SIMAP model estimates a subsurface release would surface within 2.2 meters of the subsurface location (EmergeWest Consulting, 2014).
- The Second SEIS analyses do not assume a static environment and, where appropriate, implications of environmental change and uncertainty have been considered. For example, stochastic variation in oil-spill trajectories is presented in a conservative manner. Underlying circulation models rely on updated data and a continual process of improvement in predictive approaches. BOEM continuously seeks to improve its oil spill trajectory modeling results. As the commenters point out, BOEM convened a workshop entitled "Evaluation of the use of Hindcast Model Data for OSRA in a Period of Rapidly Changing Conditions" and assembled experts in ocean, meteorological and sea ice modeling in 2011 (SAIC, 2011). BOEM uses the results of these types of workshops to guide BOEM-funded environmental studies including oil-spill trajectory modeling. One conclusion from this study was that "forecast models are not exact and display a wide variance among themselves; so much so that they cannot be relied upon for applications with OSRA in the near term (Samuels, Amstutz and Crowley, 2011)." Therefore, updated hindcast models still remain the best tool available to BOEM for use in OSRA. In 2011, BOEM funded work for a new coupled ice-ocean model for the region of interest, and used the results of that most recent simulation in the OSRA model for this Second SEIS as discussed above. It is impractical to use data from the most recent years at this time because the high resolution forcing fields do not exist. Another study will be used to procure additional model year output.
- Another recommendation from the study is to improve data coverage to understand changes in major environmental parameters important for the OSRA mission. BOEM continually expends funds to collect oceanography, meteorology, and sea ice observations and uses them for validation and sensitivity testing of coupled ice ocean circulation model output (i.e. Mahoney et al., 2012; Weingartner et al., 2012; Zhang et al., 2013). Current ongoing studies include Characterization of the Circulation on the Continental Shelf Areas of the Northeast Chukchi and Western Beaufort Seas, Satellite-Tracked Drifter Measurements in the Northeast Chukchi Sea, Development and Testing of a Low-Cost Satellite-Tracked Ice Drifter for Arctic Waters and Sea Level Measurements along the Alaskan Chukchi and Beaufort Sea Coasts (USDOI, BOEM, 2014b).

- The development Scenario postulates that crude oil will be moved by pipeline and not tankered from the leased area (Section 2.3). Therefore, shipping accidents from tankers are not postulated to occur in the Scenario and were not considered in the oil spill trajectory analysis.
- The oil-spill trajectory analysis estimates a <0.5 – 2% chance of a large or a fraction of a very large oil spill contacting Bering Strait during winter or summer within 360 days (Appendix A Tables A.2-48 and A.2-72). Although a large or very large oil spill may reach the Bering Sea it would be unlikely to persist and reach western Canada or Washington along the Pacific coast.
- The OSRA modeling does not include weathering but the large or very large oil spill analysis does not discount oil weathering. Instead BOEM uses one of the few weathering models (SINTEF oil weathering model) which actually includes ice in estimating oil weathering (Reed et al, 2005). In 1990 MMS (now BOEM) invested heavily to begin the process of including ice in oil weathering and has continued studies on weathering of oil in ice. The use of a stand-alone weathering model allows BOEM the flexibility of looking at different types of crude, condensate and fuel oils and their weathering characteristics rather than a single oil type for multiple different reservoirs. BOEM funds studies specifically to weather oils in both the lab and mesoscale to use this updated information for oil spill weathering (Mar et al., 2008; USDOI, BOEM, 2014a).
- In contrast to the OSRA model, the primary goal of NOAA's GNOME is to predict the oil spill trajectory once an accidental spill occurs but it is also used to educate oil-spill response personnel on oil spill trajectory behavior. NOAA has developed GNOME location files for the Arctic (North Slope of Harrison/Gwydyr Bays and Stefansson Sound east to the Mackenzie River) to allow operators and the U.S. and Canadian Coast Guard to simulate and understand various oil spill scenarios during the Arctic open water season. As discussed below, with funding from BSEE, NOAA is working towards including ice because neither GNOME nor ADIOS currently include an ice component.
- BOEM is closely monitoring several ongoing investigations to improve trajectory modeling in the Arctic. BSEE, a cooperating agency on this Second FSEIS contracted with USDOC, NOAA to include ice in both ADIOS and begin the development of a subsurface GNOME model for the Beaufort (Barker and Lehr, 2013). The main goal of this research project is to adapt existing National Oceanic and Atmospheric Administration Emergency Response Division (NOAA/ERD) models to more accurately represent spills in a cold weather/arctic environment from potential well blowouts as well as shipping and oil transport accidents. The focus will be on spills in cold waters where sea ice may be present, and blowouts in the U.S. Arctic region. The estimated completion of this project is September 24, 2015.

Specifically, the objectives of the research are to:

- Develop a well blowout plume model appropriate for use under arctic conditions.
- Identify and develop appropriate algorithms for modeling the fate of spilled oil under arctic conditions. Identify and develop appropriate algorithms for modeling the transport of spilled oil under arctic conditions.
- Produce an operational oil spill fate and transport model suitable for use for a spill under arctic conditions that will be made available for use by the entire oil spill preparation, planning and response community.

In January 2012, members of the international oil and gas industry launched a collaborative effort to enhance Arctic oil spill capabilities under the auspices of the International Association of Oil and Gas

Producers (IOGP). This collaboration, called the Arctic Oil-Spill Response Technology Joint Industry Programme (JIP) will expand industry knowledge of oil spill trajectory modelling in ice (IOGP, 2012). Four topics as focus have been identified: (1) High-resolution ice modelling (2) Regional ice modelling (3) Integration into oil spill trajectory modelling and (4) Validation program.

Issue 27. Large Oil Spill Assumptions

Summary of Comments

A few comments called into question BOEM's assumptions concerning the number, timing, source, and/or volume of the large oil spills assumed to occur from the Proposed Action for the purpose of analysis in the Draft Second SEIS. The data set used by BOEM to estimate these events was questioned. It was also stated that BOEM should analyze a large spill during exploration and should use the mean spill size (as opposed to the median spill size) when characterizing the size of assumed oil spills.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public
- Response to Comments

BOEM uses robust oil spill data analyses and a fault tree model to estimate the large OCS oil spill rates and median spill sizes (Anderson, Mayes, and LaBelle, 2012; Bercha Group 2013, Bercha Group 2014a, b; Nuka, 2013) for purposes of analysis in this Second SEIS. The U.S. OCS and Alaska North Slope oil spill databases are sufficiently comprehensive to allow BOEM to address the important questions regarding oil spills. An essential question when addressing oil spill rates is how reliable is this data as it relates to these systems and exposure variables, given BOEM's requirements. The OCS offshore spill data is compiled by the BSEE (USDOI), the USCG (DHS), and (for common carrier or trunk lines) the Office of Pipeline Safety (DOT). BSEE carefully quality assures and quality controls (QA/QC) the oil-spill data prior to analyses. BSEE also makes OCS oil-spill data publicly available and transparent on its website. Elsewhere in the world, oil-spill data is not publicly available and is difficult or impossible to obtain or QA/QC the data. BOEM is aware of large/very large spills that have occurred during exploration internationally (USDOI, BOEMRE, 2011, Appendix B, Table B-2); however, information about a few spills without having a QA/QC'd spill database and exposure variables is not scientifically rigorous enough to determine an adequate spill rate. International data increases the size of the dataset and is more likely to capture additional large or very large spill events; however, it assumes that non-U.S. events are relevant to U.S. events to the extent that technology, maintenance, operational standards and other factors are equal; but this is unlikely to be the case (especially in cases of military action).

The large oil spill rates are used to estimate the mean number of large spills over the life of the exploration development and production Scenario as well as the cumulative case. The SEIS discusses the large spill assumptions in Section 4.1.2.5 and in further detail in Appendix A, Section A-4. Appendix A, Section A-5.1.2 discusses in detail the small oil spill analyses for exploration and delineation drilling activities. Appendix A, Section A-8.4 discusses in detail the cumulative case oil spill analyses for potential large spills from past, present and future production.

For purposes of analysis, BOEM analyzes a very large oil spill (2.2 million barrels) from any phase of operation either exploration or development. Section 4.1.2.5 describes the rationale for analyzing

large spills longitudinally through the 77 year time frame and Table 4-4 shows the generalized size, type, and timing of large and small spills. The mean number of large spills is calculated by multiplying the spill rate from the Fault Tree model by the estimated resources produced (4.3 Bbbl). By adding the mean number of large spills from platforms and wells (0.5) and from pipelines (0.9), a mean total of 1.4 large spills was calculated for the Scenario. For the purpose of the analysis, BOEM assumes that two large spills would occur during the development and production portion of the Scenario. Assuming a number of spills that is higher than the most likely number of spills helps to ensure that this Draft Second SEIS does not underestimate potential environmental effects.

The chance of no large platform (platforms and wells) spills occurring is 61% and the chance of one or more large platform (platforms and wells) spills occurring is 39% over the life of the exploration and development Scenario (Appendix A, Table A.1-21). Statistically, it is more likely that a large spill will not occur from a platform or well over the life of the exploration and development Scenario. The chance of no large pipeline spills is 41% and the chance of one or more large pipeline spills is 59%. The addition of pipelines during the development phase adds the additional mean number of spills to make large spills more likely during the development phase. Considering the underlying information about the historical occurrence of spills during exploration (Appendix A, Section A-5.1.2), the short time period of exploration and the contribution of wells and platform large crude oil spills during the life of the project, BOEM appropriately analyzed large spills during the development phase of the 77 year life of the oil spill analysis.

BOEM considered small spills from refueling for vessels. The USCG regulates vessels in U.S. waters and analyzes information from vessel spills. The USCG regulations addressing vessel oil-spill response plans for tank vessels and non-tank vessels can be found at Title 33, Code of Federal Regulations, Part 155 -- PART 155—Oil and Hazardous Material Pollution Prevention Regulations for Vessels – Subparts D and J respectively. In short, all tank vessels and all non-tank vessels 400 gross tons or greater that operate on the navigable U.S. waters and are not on innocent passage, are required to have a vessel response plan to address the worst case discharge or threat thereof. BOEM considered the hazards from offshore supply vessels (OSVs). Historic data showed that with just a few exceptions, spills from OSVs have been relatively small in volume. Nearly 96 percent of all spills average 10 gallons in quantity. Most of these operational spills occurred while the vessels were on station offshore in direct support of the offshore industry (USCG, 2012). BOEM considered fuel spills of up to 50 bbl (2,100 gal) in its oil spill analysis.

Anderson, Mayes, and LaBelle (2012) is the third in a series of peer reviewed publications addressing large OCS oil spill median spill sizes [See also Issue 24 Oil Spill Probability]. The previous publication Anderson and LaBelle (2000) was updated to reflect the new OCS spill information and is the best available information to estimate likely large spill sizes on the OCS. The median spill sizes are based on a trend analysis of the entire dataset and statistically validated for the interval chosen (Anderson, Mayes and LaBelle, 2012).

The primary difficulty in using average spillage statistics is the possible variability in the value of the sum of several random numbers. The number of large OCS spills, statistically speaking, is quite small. In addition, the underlying distribution is highly skewed with many more small spills occurring than large spills. The use of a statistical average is not meaningful for the reasons described above. BOEM uses the median volume as an appropriate measure for purposes of oil spill analysis.

BOEM's analysis does not understate impacts. BOEM's determination to analyze large oil spills based upon the median-size spill for platforms and pipelines, respectively, is reasonable because utilizing the mean spill size would distort the impacts that are reasonably expected to occur from the two large spills assumed to occur over the life of the Scenario. Rather than analyze only highly improbable spill sizes (i.e., the mean), BOEM attempts to present a more comprehensive analysis of spills by analyzing: (1) the impacts from the more likely median large spill sizes; and (2) the impacts

from a very large spill. Additionally, the agency conservatively chose to assume that two large spills will occur, even though the Fault Tree model predicts less than that. The OSRA estimates the probability of oil spills greater than or equal to 1,000 bbl occurring and contacting environmental resources. This probability, by itself, does not describe effects, or impacts. The subject matter experts that are knowledgeable about the vulnerability of the resource of interest describes the impact of spilled oil on that resource, and then relates the probability of one or more spills of 1,000 bbl or greater contacting that resource, to obtain their conclusion regarding the impact of oil spills on the resource.

Issue 28. Very Large Oil Spill Scenario

Summary of Comments

A few comments concerned the hypothetical Very Large Oil Spill scenario described and analyzed in the Draft Second SEIS. It was noted that there seems to be less discussion about the probability of a VLOS as compared to earlier NEPA documents related to Lease Sale 193.

Several comments noted information requests about the oil-spill trajectory analysis for a very large oil spill including:

- A visual model of the VLOS scenarios showing the plume spread at selected intervals would be the preferred way to present information to the public.
- BOEM has made technical revisions to its "approach to assessment" for certain environmental factors, e.g., Very Large Oil Spill (VLOS) and Oil Spill Risk Analysis (OSRA). BOEM should discuss in more detail what changes were made in the Draft Second SEIS, why the agency made these changes to its approach, whether prior analyses are applicable to the new scenarios, and the impacts of these changes on the ultimate analysis.

Another comment challenged the assumption that a VLOS can be stopped within 74 days by the drilling of a relief well. Submitting that this estimate is unreasonable for a spill that occurs near the end of the drilling season because it does not take into account the possibility that winter conditions will delay the completion of a relief well until the next open-water season. Other comments addressed the length and depth of the VLOS discussion in the Draft Second SEIS. Some comments found that existing discussion inadequate in light of the severity of potential impacts and public concerns, while others held that the existing level of analysis was too high given the extreme unlikelihood of such an event. Another comment states the VLOS scenario did not include a shipping accident.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

The VLOS is estimated to result from a loss of well control and subsequent long-term oil spill release. The chance of a loss of well control is analyzed in detail in Section 4.4.1, Subsection OCS Well Control Incidents of the Second Final SEIS.

Marine Vessel Traffic was analyzed in Section 5.1.2.3 as a potential cumulative impact factor and resource sections within Section 5.2 Analysis of Cumulative Effects analyzed the impacts, including hydrocarbon spills.

Trajectory modeling was conducted for the VLOS scenario (Appendix A, Section A-7.5.Very Large Oil Spill Conditional Probabilities). BOEM provides the detailed chances of a fraction of a very large oil spill (expressed as a percentage) contacting various resources in Appendix A.2. The impact analyses assumed oil contact using Appendix A, Tables A.2-28, 30, 34, 36, 40, 42, 54, 60 and 66, which show summer and winter seasons within 60 and 360 days contacting resources illustrated in Maps A.1-2 through 4. The resources in the OSRA model cover an array of areas and provide comprehensive information for a lease sale oil spill analysis. The tables, illustrations and analysis provides sufficient information for subject matter experts to make reasoned very large oil spill analyses and enable the decision-make to consider fully the impact factors involved.

BOEM will continue to work with stakeholders to develop products that can visually display the stochastic footprint of an oil spill in a meaningful way that is useful to offshore resource specific impact analysis. The analysis of the discontinuous area contacted has been added to Appendix A, Table A.1-27 and cited in Section 4.4.2.

Appendix A, Section A-3.1.5 explains that BOEM has information regarding where companies leased blocks in Lease Sale 193. For this analysis, the launch areas (LAs) and pipeline segments (PLs) are hypothetical locations which have been reduced to the existing leases and adjacent areas called the Leased Area. BOEM has also included this additional information in the Very Large Oil Spill section.

BOEM updated the underlying components of the oil spill trajectory model including the general ocean ice circulation model, the environmental resource areas, the grouped land segments and the shoreline environmental sensitivity index percentages for each land segment described in Appendix A, Section A.3-1.

The original trajectory analysis for the Lease Sale 193 FEIS, published in 2007, was run in 2005 using a coupled ice ocean model completed in 2001. Normally, BOEM continuously updates the oil spill trajectory analysis for new lease sales. However, cancellation of Chukchi Sea lease sales (Sales 212 and 221) and litigation have created a prolonged period where information was not regularly updated. Both Industry and BOEM have spent significant resources to gather and analyze new information within and adjacent to the Chukchi Sea Leased Area. BOEM made extensive use of Industry, Academic, Non-Governmental Organizations and Federal and State government information in updating the underlying components of the OSRA model used in this Second SEIS.

BOEM used the results of the OSRA model in its analyses of Large and Very Large spills in sections 4.3 and 4.4. The conclusions of those analyses are predicated on the changes in the Scenario as well as the OSRA model and other relevant factors related to the particular impact evaluated. Overall, the OSRA model results are similar to previous analyses and the Leased Area is still a subset of the area analyzed in 2007 and again in 2010. About one third of the exact original ERAs from the 2007 and 2010 OSRA analyses were retained in the OSRA model run for the Second SEIS. The other ERAs were modified or added based on new information so an exact comparison to previous analyses is not possible.

The VLOS scenario uses an assumption that obtaining and transporting a relief rig to the hypothetical site of the VLOS and drilling and completing the relief well would total 74 days. The 74 days is based on the hypothetical location of the drill site, the hypothetical location of a drilling rig available for drilling a relief well, and average transport speeds and drilling rates. If drilling is proposed as a result of Lease Sale 193, the exploration plan or development and production plan must be accompanied by an oil-spill response plan for BOEM's and BSEE's review, evaluation, and approval.

The exploration, development, and production Scenario does not postulate tankering crude oil as analyzed in Section 2.2. Section 4.4.2 VLOS Scenario, Subsection Rate, Time and Composition of Hypothetical Spill states "The VLOS scenario assumes a blowout leading to a very large oil spill. In developing this scenario, BOEM first generated a hypothetical oil discharge model that estimates the highest possible uncontrolled flow rate that could occur from any known prospect in the Leased Area, given real world constraints. BOEM appropriately modeled and analyzed a 2.2 Million barrel crude very large oil spill."

Marine Vessel Traffic was analyzed in Section 5.1.2.3 as a potential cumulative impact factor and resource sections within Section 5.2 Analysis of Cumulative Effects analyzed the impacts, including hydrocarbon spills.

To the extent that the VLOS discussion in the Second SEIS may be smaller than that provided in the 2011, this is due to the fact the Second SEIS is updating the 2011 analysis, not necessarily repeating everything provided in the previous document. BOEM finds the current amount of discussion appropriate for these low-probabilities, high-impacts events.

Issue 28. Oil Spill Impacts

Summary of Comments

- Oil spill effects are not reversible
- Need more discussion on the post-spill resilience of species
- I am concerned about potential oil spills and the disastrous effect that will have on the Arctic waters and all that it supports; from the walrus, seals, whales and polar bears at the top, to the tiny organisms at the bottom. I am concerned about the effect of a spill on birds. I am concerned about the potentially catastrophic effects that a spill will have on subsistence and native cultures.
- Effects of spill on the general albedo of the Arctic region
- Only reasonably foreseeable impacts should be considered when determining the significance of environmental impacts. Given the low probability of spills, [should not be factored in to these determinations].
- It is not clear why the mitigating effects of spill response are not considered and analyzed, but the detrimental effects of spill response are discussed in detail. It should also be noted that the Alaska Regional Response Team (ARRT) has adopted the latest version of DEC's In Situ Burning Guidelines (2008)
- You are correct in identifying a spill in the spring lead system as a catastrophe
- In the impacts summaries, please describe at which phase large oil spills are expected to occur.
- The conclusion sections for different time periods should reflect the potential impacts from all IPFs. For example, for the Exploration and Development (Year 10-25) period, the conclusion does not adequately capture the potential impacts from a large oil spill (which is expected to have population-level effects). It may benefit the reader (and the document) if impacts without an oil spill (which are a given) were first described in the conclusion, followed by the description of impacts with an oil spill (which is a possibility).

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations

- Corporations and Industry Groups
- General Public

Response to Comments

As explained in the front matter of Chapter 4 (Section 4.1.2.5), two large spills are assumed to occur for the purpose of analysis. The environmental resource analysts evaluate the potential effects of small and large spills on the environmental resources. Impacts associated with these hypothetical spills are therefore factored into the overall determination of effects from the Proposed Action for each environmental resource. Analysis of the assumed oil spills and corresponding determinations of effect are provided in the various subsections of Section 4 and are also factored into the cumulative effects analysis of Section 5.

Text has been modified where necessary to clarify conclusions. "Large" spill in this case refers to a 5,100 bbl or a 1,700 bbl spill, which are the statistically anticipated spills associated with the Scenario. These spills are not anticipated to have population-level effects.

Conversely, a VLOS is not assumed to occur; therefore, impacts stemming from a hypothetical VLOS event are not factored into the determinations overall effects from the Proposed Action. The analysis of the effects of a VLOS is presented in Section 4.5.

Table 4-4 in Section 4.1.2.5 shows the generalized, size, type and timing of spills through time.

Post spill remediation is analyzed in these sections where applicable.

Issue 29. Spill Response and Cleanup

Summary of Comments

Many comments were received about the inherent challenges of oil-spill response and cleanup under Arctic conditions. Commenters expressed concern about the effectiveness of current spill response methods. Many comments address this issue generally:

- Given the region's remoteness, extreme weather, and lack of infrastructure, cleaning up an oil spill in the Arctic Ocean would be all but impossible
- There is no proven technology or effective method to clean up oil spills in the Arctic
- No experience cleaning up spills in icy waters
- There are no effective procedures or contingency plans on the books as to how to proceed in the Arctic
- It will be impossible to clean up an oil spill if sea ice is present
- In the event of an oil spill, how are you going to clean up ice?
- Failed oil spill tests in ice-rich areas
- A spill occur in the icebound Arctic Ocean would be simply unstoppable
- Many of the assets necessary for a robust response to a VLOS are located nowhere near the lease area (days if not weeks away)
- There is not enough infrastructure on Alaska's North Slope to even respond with conventional cleanup technology
- The Chukchi Sea doesn't even have adequate Coast Guard or Coastal Policy in place
- There is virtually no infrastructure, the dynamics of how an oil spill would behave or spread under the variety of Arctic ice conditions are virtually unknown, little is known also about how to contain or clean up a spill amidst sea ice, and the technology to effectively carry out a cleanup in Arctic Ocean conditions has not yet been developed

- Industry lacks the capability to respond to an oil spill much less contain it and clean it up
- Responsible development means having the proper tools in place to mitigate spills and ruptures as they happen
- The offshore drilling industry has developed no new spill cleanup technology in decades; and
- The unpredictable nature of sea ice greatly increases the danger and impacts of an oil spill

Some commenters had comments on specific response tactics:

- The biologically or environmentally sensitive areas at sea and on the shore have not been identified and mapped, which is information essential to effective cleanup in the event of a spill
- The SEIS incorrectly assumes that dispersants can be an effective oil-spill response technique in "cold and ice infested waters" such as those in the Chukchi Sea. In fact, existing research shows that there is considerable uncertainty about the effectiveness of dispersants in such conditions
- The dispersant studies relied upon by the SEIS contain multiple methodological shortcomings
- Early winter conditions could delay or preclude completion of a relief well
- The SEIS assumes that a VLOS can be stopped within 74 days by the drilling of a relief well. This assumption is unreasonable for a spill that occurs near the end of the drilling season, because it does not take into account the possibility that winter conditions will delay the completion of a relief well until the next open-water season
- Consider an alternative in which leases are only permitted for Exploration and Production ending with enough time such that Lessees would be able to respond to a worst case discharge before the predicted onset of sea ice
- Consider an alternative with a limited drilling window to enable response to a worst case discharge before the predicted onset of sea ice;
- The Alaska Regional Response Team has adopted the latest version of ADEC's In Situ Burning Guidelines (2008)
- Cleanup in winter means any underwater work must be done below the ice in temperatures that will freeze-up most equipment on the surface
- I want our rivers, our streams, our creeks protected from that oil spill
- River mouths should be protected by booming
- Consider using non-toxic absorbents
- Development of a training program for effective oil-spill response is impossible, and therefore, training necessary for effective cleanup has not occurred
- Need to consider stronger currents in Arctic than in GOM, implications to spill response including crew hazards
- Additional infrastructure for spill response is needed in all of our Chukchi Sea coastal communities
- I like the idea of having oil response barges here in Kotzebue Sound
- Additional infrastructure for oil-spill response needs to be sited in the Chukchi Sea coastal communities; and
- An oil-spill response and support services program based in Point Lay would be beneficial to the region

Several comments criticized the manner in which the Draft Second SEIS addressed and analyzed oil-spill response and cleanup:

- Only 12 pages of the SEIS talk about opportunities for intervention and response, which is insufficient and implies a lack of suitable technology
- The SEIS does not adequately account for the uncertainty of oil spill cleanup in the Arctic as identified in the April 2014 National Academy of Science's National Research Council's report
- The SEIS analysis of response tactics should be updated to better represent the challenges of Arctic spill response
- The description of procedures for responding to oil in ice should be updated to incorporate the challenges and experimental nature of these activities
- The estimated recovery rates and estimates for oil reaching shore should be revised to better incorporate the expected recovery rates in the Chukchi Sea
- The SEIS contains several omissions in its discussion of the potential impacts of dispersant use on wildlife, especially bowhead whales, and on the indigenous communities that depend on that wildlife; and
- I'd like to see more information on oil-spill response times

Many comments expressed concern about the unintended, harmful consequences of spill response activities on the environment:

- Multiple scientific studies have shown that dispersants themselves can be harmful to wildlife, either directly—because of the toxicity of the chemicals in the dispersants—or indirectly—because the dispersants can increase the toxicity of the oil
- The SEIS shows that measures used to clean up a spill, like chemical dispersants and burning the oil, would add threats to marine animals; and
- Using Corexit and other toxic oil dispersants does not "clean up" the oil, only sinks it out of sight in the water column and makes it more easily absorbed through the skin

Finally, several comments do not fit into the categories above:

- The Federal Government refuses to require oil companies to submit adequate cleanup plans and refuses to impose adequate standards or oversight
- What are the safeguards for a major spill?
- Several international oil and gas companies with substantial experience with Arctic operations are collaborating on a program of research to improve Arctic spill response under the auspices of the IOGP (formerly International Association of Oil and Gas Producers) as participants in the Arctic Oil-Spill Response Technology Joint Industry Program ("JIP")
- It is not clear why the mitigating effects of spill response are not considered and discussed, but the detrimental effects of spill response (in situ burning and spill response vessel emissions) are analyzed in detail
- The State of Alaska spill response standards are more stringent than Federal standards in the following areas:
    - Prompt deployment: AS 46.04.030{1)
    - Seasonal drilling 18 AAC 75.425(e)(1)
    - Realistic maximum response operating limitations 18 AAC 75.425{e)(3)(D) and 18 AAC 75.445(f).

  - Response planning standard volumes 18 AAC 75. 434(a)-(d) and 18 AAC
- How does the government intend to take care of people on the North Slope if a catastrophe happens?
- If there is an oil spill (especially one that negatively impacts subsistence), how do you assess the damage to culture?
- The government should allow using OPA 90 money to help communities prepare to respond to future spills.
- The U.S. should embrace more meaningful oil spill prevention commitments like higher liability caps.
- Application for Permit to Drill reviews of blowout prevention capabilities should be enhanced.
- Alaska needs a coastal initiative, icebreaker and trained spill response personnel before any drilling should even be contemplated. We are decades from readiness.
- Stipulation No.7 is ambiguous and has limited the ability for Point Lay and its village corporation to prepare for an oil spill.

Source of Comments

- Federal Government
- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

BOEM shares concerns regarding the potentially devastating effects of a catastrophic oil spill. BOEM also acknowledges that, while multiple methods for recovering and cleaning up spilled oil exist, severe weather and/or the presence of ice could interfere with or temporarily preclude each of these methods. To address this, both BOEM and BSEE, as well as industry groups, support on-going research related to spill response and the protection of environmental resources. The highest emphasis, however, is on pollution prevention. The following discussion responds to comments regarding spill response and cleanup techniques.

Scope of the SEIS discussion on spill response and cleanup. The SEIS analyzes potential environmental effects associated with leasing. It is not the purpose of this document to plan and analyze response scenarios. Oil-Spill Response Plans (OSRPs) would be evaluated on a plan-by-plan basis at the Exploration Plan phase and again at the Development and Production Plan phase. The regulations for OSRPs are found at 30 CFR 254. The requirements are strict and BSEE's analysis of a proposed OSRP is vigorous.

Spill response and cleanup under arctic conditions. To inform the environmental effects analysis and eventually BOEM and DOI decision makers, spill response activities are described in Section 4.4.2.3.4 of the Final Second FEIS. BOEM provides a description of acceptable types of spill response equipment and methods to provide the public and the decision maker with a basic picture of what a response would look like, as well as to facilitate analysis potential impacts from spill response activities. The level of detail in the SEIS is sufficient to accomplish these goals. More precise estimates of the effectiveness of typical spill response types depend on many factors (for example, oil

composition, weather, distance from response staging area to the spill location, etc.) and are unnecessary for decision-making at this phase of OCS activities (i.e., the leasing phase).

Research has shown that the strategies in the spill response "tool box" have varying effectiveness under varying conditions in the Arctic. In the event of a spill, a combination of response strategies would be used to maximize the effectiveness of the overall response under the specific existing conditions. The Alaska Regional Response Team has developed the Alaska Federal/State Preparedness Plan for Response to Oil and Hazardous Substance Discharges/Releases (Unified Plan) and associated Subarea Contingency Plans, which provides Alaska-specific information for plan holders, incident management teams, and stakeholders regarding: response expectations and regional challenges; policies and guidelines; standardized nomenclature; possible infrastructure and resource sourcing options.

Late season drilling and spill response. The VLOS scenario uses an assumption that obtaining and transporting a relief rig to the hypothetical site of the VLOS and drilling and completing the relief well would total 74 days. The 74 days is based on the hypothetical location of the drill site, the hypothetical location of an available drilling rig, and average transport speeds and drilling rates. If drilling is proposed, the exploration plan or development and production plan must be accompanied by an oil-spill response plan for BOEM's and BSEE's review, evaluation, and approval.

Drilling restrictions as mitigation are appropriately considered by BOEM at the Exploration phase. As a condition of approval of Shell's 2012 Exploration Plan, BOEM prohibited Shell from drilling in prospective hydrocarbon zones after September 23. BOEM required this to allow a reasonable period of time to respond to and clean up any potential spill before the predicted presence of ice at the drill site as based on BOEM's analysis of historic sea ice data.

Recovery rates/effectiveness of spill cleanup. The volume of the assumed large oil spills and the hypothetical VLOS are not adjusted to account for successful response and cleanup. This approach acknowledges the potential difficulties of responding to a spill under various conditions (i.e., cold, darkness, ice, wind) and furthers the goal of analyzing a low-probability, high impact event. And it does so without shifting the focus of this environmental effects document into a debate about the efficacy of spill response techniques. Successful spill response and cleanup efforts would indeed help reduce the amount of spilled oil contacting or otherwise affecting valued resources. Yet it is also true that in the event of a spill, response and cleanup efforts can incidentally cause certain adverse impacts to environmental resources. These impacts are a foreseeable consequence of spill response and cleanup activities and are analyzed accordingly.

Use and effectiveness of dispersants. BOEM acknowledges that the behavior, effectiveness and potential toxicity of dispersants is dependent upon many factors. As discussed throughout Chapter 4 of the SEIS, particularly in VLOS sections, these factors include water temperature, surface salinity, wave and wind energy, light regime, water depth, type of oil, concentration of dispersant, how the dispersant is applied (constant or intermittent spikes), chemical makeup of the dispersant, and exposure time to organisms. BOEM also acknowledges that chemically dispersed oil is thought to be more toxic to water column organisms than physically dispersed oil, but the difference is currently subject to debate and generally the toxicity is within the same order of magnitude. BOEM also discusses, in Appendix A, the results of toxicity testing of a dispersant used during the DWH spill, and discloses that while dispersants "help make the oil more bioavailable so that the oil is subject to increased degradation, including biodegradation . . . oil that is more bioavailable may also be more toxic to some species."

Although research into the use and effectiveness of chemical dispersants has shown varied results, dispersants nonetheless may be a response option for the Chukchi Sea under certain limited conditions (for example, the presence of ice may preclude the use of dispersants). Planning for the potential use of dispersants in the event of a Chukchi Sea oil spill is initially done during the

exploration and development phases of OCS activities, with the preparation of Oil-Spill Response Plans. Dispersants, however, are not currently pre-authorized for use in the Chukchi Sea. If the use of dispersants would be requested as part of the response, each request for dispersant application would be evaluated and approved on a case-by-case basis by the Federal On-Scene Coordinator (FOSC) in consultation with EPA, DOI and DOC. The approvals would also be based on the specific conditions (for example, the chemical composition of the oil, the degree of oil weathering, the type and amount of dispersant to be used, and the temperature and salinity of the marine waters). After consultation with the appropriate agencies, the FOSC would make the decision on how and when the dispersants would be applied.

The Second SEIS analyzes potential effects of using dispersants to the extent it can meaningfully do so without knowing the precise chemical formulations, locations or volumes of dispersants to be used. This analysis is included throughout Chapter 4, including the sections on marine mammals (4.3.7); water quality (4.5.2); air quality (4.5.3); lower tropic organisms (4.5.4); fish (4.5.5); cetaceans (4.5.7.1); ice seals (4.5.7.2); walrus (4.5.7.3); polar bears (4.5.7.4); subsistence-harvest patterns (4.5.11); public health (4.5.13) and archaeological resources (4.5.15).

The discussion in the Final SEIS also takes into account information developed since the 2011 SEIS. As noted in Fingas, 2014, "[t]he literature on oil spill dispersants between 2011 and 2014 is extensive, consisting of more than 200 papers," however, "[t]he benefits or deleterious effects of using dispersants to reduce impacts on wildlife still remain unknown"; issues pertaining to the effectiveness of dispersants remain unresolved due to the large number of factors that influence effectiveness and the wide variety of testing results; and "[t]he results of dispersant toxicity testing are similar to that found in previous years, namely that dispersants vary in their toxicity to various species." The literature provided by commenters has been reviewed and taken into consideration. The text of Chapter 4 has been supplemented where appropriate to clarify potential impacts from the use of dispersants. Due to the many variables associated with the use of dispersants, more specific discussion would not be meaningfully informative at this phase.

Boom deployment. Boom deployment and response effort prioritization will be dependent on where oil will come to shore. Priority Protection Sites (PPS) have been identified in the Alaska Clean Seas Technical Manual, which has been incorporated by reference into the North Slope Subarea Contingency Plan. Prioritization would be based on the time of the year the spill occurred and the resources that could be impacted by oil entering the area.

Compensation for impacts to subsistence resources. In August 1990, President George H.W. Bush signed the Oil Pollution Act (OPA) into law and authorized use of the Oil Spill Liability Trust Fund (OSTLF). Under the OSTLF, any person or organization that has suffered damages may submit a claim, including a loss of subsistence use claim if natural resources you depend on for subsistence use purposes have been injured, destroyed, or lost by an oil spill incident. Anyone who, for subsistence use, depends on natural resources that have been injured, destroyed, or lost can submit a claim.

Environmental effects of response activities. The SEIS analyzes the potential effects of a VLOS by the phase of events that constitute the spill: Phase 1 – Well Control Incident; Phase 2 – Oil Spill; Phase 3 – Onshore Contact; Phase 4 – Spill Response and Cleanup; and Phase 5 – Post-Spill, Long-Term Recovery. The EIS acknowledges that response activities may be an impacting factor on sensitive environmental resources. Not all analysts addressed the potential effects of spill response of their environmental resources. This level of detail is unnecessary for decision-making at this phase of OCS activities (i.e., the leasing phase). Decisions on spill response strategies are made at the exploration phase and development and production phase of OCS activities.

Research. In acknowledgement of the need for additional information on spill response tactics, effectiveness, and consequences, both BOEM and BSEE have on-going studies to address these issues.

BSEE is the principal Federal agency that funds oil-spill response research (through the Oil-Spill Response Research [OSRR] Program). For more than 25 years, the DOI has maintained a comprehensive, long-term research program to improve oil-spill response technologies. The major focus of the program is to improve the knowledge and technologies used for detection, containment, and cleanup of oil spills that may occur on the U.S. Outer Continental Shelf.

BSEE's OSRR program is an openly cooperative effort bringing together funding and expertise from research partners in government agencies, industry, and the international community for the sole purpose of participating in research and development (R and D) projects. Many of these projects are Joint Industry Projects, where the BSEE partners with other stakeholders to maximize research dollars. BSEE has cooperated in the exchange of technological information with Canada, France, Germany, Japan, Norway, and the United Kingdom through informal contacts, workshops, and technical meetings such as the International Oil Spill Conference. Most procurements of R and D projects are competitive.

Current OSRR projects cover a wide spectrum of oil-spill response issues and include laboratory, meso-scale, and full-scale field experiments. Major topic areas include the following:

- Remote sensing and detection
- Physical and chemical properties of crude oil
- Mechanical containment and recovery
- Chemical treating agents, dispersants, herders, and absorbers
- In situ burning
- Deepwater operations
- Operation of Ohmsett – The National Oil-Spill Response Test Facility

Information on OSRR can be found at http://www.bsee.gov/Research-and-Training/Oil-Spill-Response-Research/index/.

BOEM's Environmental Studies Program (ESP) plans, conducts, and oversees environmental studies that cover a broad range of disciplines, including physical oceanography, atmospheric sciences, biology, protected species, social sciences, economics, submerged cultural resources and the environmental impacts of energy development. Information from these studies support the oil spill risk analysis (OSRA) modelling, identification of sensitive resources, and development of measures to decrease the potential effects of OCS activities, accidental spills, and spill response. Through the ESP, BOEM is a leading contributor to the growing body of scientific knowledge about the marine and coastal environment. BOEM has funded more than $1 billion in research since the studies program began in 1973.

Information on ESP can be found at http://www.boem.gov/Environmental-Studies-Program-Fact-Sheet/.

Stipulation No.7. Cully Corporation states its ability to pursue an Oil-Spill Response (OSR) program has been limited because of uncertainty regarding the restrictions imposed by Stipulation No. 7 to the Chukchi Sea OCS leases sold in Lease Sale 193. Cully is specifically concerned about Stipulation No. 7(A)(2)(b), which prohibits "surface vessels associated with exploration and delineation operations " from entering the Ledyard Bay Critical Habitat Unit (LBCHU) during the open water season (July 1 through November 15) except for "emergencies or human/navigation safety, " in which case, vessel travel in the LBCHU must be reported to BOEM within 24 hours.

BOEM acknowledges the desirability of having oil-spill response assets located in and near Ledyard Bay, as well as having well trained local citizen available to pursue rapid and effect cleanup operations. For this reason, BOEM does not consider entry into the LBCHU by Cully or any other

contractor for the limited purpose of developing and pursuing an OSR program, including staging OSR equipment, training OSR personnel, and undertaking OSR cleanup operations, as operations conducted in support of exploratory and delineation drilling. Developing an effective OSR program is essential for protecting the environment and natural resources for which the LBCHU was established to preserve. Consequently, BOEM believes OSR preparation and response are activities undertaken as a consequence of oil and gas drilling, and are distinguishable from these activities conducted directly in support of exploratory and delineation drilling. Accordingly, it is BOEM's position that the staging, training, and deployment of OSR equipment in the LBCHU would not necessarily violate Lease Stipulation 7.

Issue 30. Lessons from the *Deepwater Horizon* Event

Summary of Comments

The EIS does not discuss recommendations identified in the aftermath of the Deepwater Horizon event that have not been implemented. These include an increase in the liability cap and financial responsibility requirement for offshore facilities, protection for whistleblowers, and adequate funding for regualtory agencies. In addition, the comment cites rules that have not yet been proposed, the "Blowout Preventer/Well Control Upgrade and the Arctic-Specific Standards.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

The *Deepwater Horizon* tragedy and the events of the 2010 summer have resulted and will continue to result in substantial organizational changes and new policies designed to improve regulatory oversight of human safety and environmental hazards. The ramifications of the DWH event for activities in the Chukchi Sea are analyzed in detail within Sections 4.4 and 4.5 of the SEIS. The DWH event, along with public comments received on the 2011 Draft SEIS, also precipitated analysis of a hypothetical Very Large Oil Spill analysis within the 2011 SEIS and this Final Second SEIS.

On January 11, 2011, the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore (Commission) issued its final report. Prior to the Commission's report, BOEM had been working to address many of the issues identified by the Commission. BOEM has undertaken the most aggressive and comprehensive reform of offshore oil and gas regulation and oversight in U.S. history. This includes the development and implementation of heightened standards for drilling practices, safety equipment, and environmental safeguards. These new rules set forth prescriptive standards that industry must meet. Further, for the first time in the U.S. offshore regulatory system, performance-based standards focused on the identification and mitigation of specific risks associated with offshore operations. These changes are substantial, and substantial work is being done to ensure that these changes are both lasting and effective. The ultimate goal is to establish an industry-wide culture of safety, and to have well-equipped and professional regulators. Both elements are necessary to keep pace with the challenges and risks of offshore drilling, particularly as those operations push into new frontiers and face increased technical challenges. As we continue moving forward, we will continue to take into account the Commission's recommendations.

For more information on the status of BOEM regulatory and structure reforms please refer to: "BOEM Director Discuss Future of Offshore Oil and Gas Development in the U.S. at Gulf Oil Spill

Series" for a synopsis of reforms being established in BOEM at http://www.boem.gov/BOEM-Newsroom/Press-Releases/2011/press0113.aspx; and BOEM Director Delivers Remarks at World National Oil Companies Congress (*Meets with Officials to Discuss Offshore Safety and Regulatory Issues*) at http://www.boem.gov/BOEM-Newsroom/Press-Releases/2011/press0622.aspx.

Further addressing the recommendations that have been suggested but are yet-to-be-implemented would be speculative at best and are not to the point where they are properly analyzed within the scope of the SEIS. In Section 4.4.1, the Final Second SEIS does discuss the completed and ongoing implementation of several actions taken in the aftermath of the Deepwater Horizon event and, apart from it, lessons learned from the nascent Arctic exploratory drilling activities. The Arctic Specific Standards are briefly analyzed in the SEIS under Upcoming Regulatory Reform in the Arctic. Pending the publication of the proposed rule in the Federal Register, the description is accurate and sufficient. The Blowout Preventer/Well Control Upgrade is being developed and does not specifically apply to the Arctic. As such it is beyond the scope of the general discussion in the SEIS. BOEM continues to exercise its regulatory responsibilities for oil spill financial liability. Effective January 15, 2015, BOEM increased the limit of liability for damages under the Oil Pollution Act of 1990 from $75 million to $133.65 million (79 *FR* 73832, December 12, 2014).

Issue 31. Lessons from Shell's 2012 Drilling Program

Summary of Comments

Some comments also stated generally that Shell and BOEM were not ready for exploration drilling in the Chukchi Sea in 2012. Many comment raised Shell's 2012 exploration drilling program as an example of why oil and gas activities in the Arctic are too challenging, too dangerous or otherwise imprudent. Specific events referenced by these commenters include:

- Shell's failure to field its Arctic Containment System;
- The near grounding of the drillship *Noble Discoverer* near Dutch Harbor;
- The need for the *Noble Discoverer* to move off the newly-spudded well at the Burger prospect due to an encroaching ice floe;
- The grounding of the drillship *Kulluk* near Sitkalidak Island;
- Clean Air Act violations incurred by the *Noble Discoverer* and *Kulluk*; and
- Violations of Coast Guard regulations incurred by the *Noble Discoverer*.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

Lessons Learned. Shell's 2012 exploration drilling program represented the first exploration drilling to occur on the Chukchi Sea OCS since five wells were drilled in the late 1980s and early 1990s. While drilling operations proceeded without incident, other aspects of Shell's program raised concerns. These concerns precipitated an expedited DOI review. The purpose of this review was "to assess, at a high level, Shell's performance across all aspects of its 2012 Alaska offshore exploration program, identify key lessons to be learned from Shell's experience, and make recommendations applicable to any future exploration drilling operations that may be proposed for the Arctic OCS."

On March 8, 2013, DOI released its report to the Secretary of the Interior entitled "Review of Shell's 2012 Alaska Offshore Oil and Gas Exploration Program" (60-Day Report) (http://www.doi.gov/news/pressreleases/upload/shell-report-3-8-13-final.pdf). The review identified a list of findings and recommendations concerning safe and responsible offshore exploration drilling in the Alaskan Arctic.

Five of these findings and recommendations apply to industry:

1. All phases of an offshore Arctic program – including preparations, drilling, maritime and emergency response operations – must be integrated and subject to strong operator management and government oversight.
2. Arctic offshore operations must be well-planned, fully ready and have clear objectives in advance of the drilling season.
3. Operators must maintain strong, direct management and oversight of their contractors.
4. Operators must understand and plan for the variability and challenges of Alaskan conditions.
5. Respect for and coordination with local communities.

Two findings and recommendations are relevant to government oversight:

1. Continued strong coordination across government agencies is essential.
2. Industry and government must develop an Arctic-specific model for offshore oil and gas exploration in Alaska.

Arctic Standards. Elaborating on its last finding, the 60-Day Report stated that:

> Government and industry should continue to evaluate the potential development of additional Arctic-specific standards in the areas of drilling and maritime safety and emergency response equipment. The United States has a leading role among Arctic nations in establishing appropriately high standards for safety, environmental protection and emergency response governing offshore oil and gas exploration in the Arctic Ocean. It is incumbent, therefore, on the United States to lead the way in establishing an operating model and standards tailored specifically to the extreme, unpredictable and rapidly changing conditions that exist in the Arctic even during the open water season.

Consistent with these recommendations, and building from DOI engagement with stakeholders, DOI has initiated a new rulemaking effort. The intent is to provide regulations to ensure Arctic OCS Region operations are conducted in a safe and responsible manner that takes into account the unique conditions of Arctic OCS drilling and Alaska Natives' cultural traditions and need to access subsistence areas. This set of draft rules, referred to as the "Arctic Standards," is described in more detail in a separate Issue Category.

Arctic Containment System. In order to be deemed submitted, an exploration plan must include either an approved Oil-Spill Response Plan (OSRP) for the facilities or a reference to a previously approved regional OSRP which covers the proposed activities (30 CFR §550.219). Approval of OSRPs is a regulatory function of BSEE. Shell's 2012 EP included an OSRP which committed Shell to field, among other assets, an Arctic Containment System (ACS) consisting of the *Arctic Challenger*, an ice class barge, as well as a capping stack, containment dome, and surface separation equipment. After approving Shell's OSRP in February 2012, BSEE's staff visited Shell's equipment in Puget Sound to verify its readiness. It became clear that the ACS was not entirely functional and would not be fielded in time to support Shell's Arctic OCS drilling operations in 2012. Because Shell failed to field the full suite of oil-spill response assets it promised, BSEE limited Shell's drilling to those areas above any zones capable of flowing liquid hydrocarbons, thus precluding any possibility of an oil spill occurring.

Critical Operations and Curtailment. On the Chukchi Sea OCS, ice can present an operational challenge at any time of year. It is essential that all operators proposing exploration drilling activities on the Chukchi Sea are prepared to deal with the encroachment of ice floes. Existing BOEM regulations at 30 CFR §550.220 reflect this understanding by requiring lessees proposed exploration plans to identify "Critical operations and curtailment procedures" for proposed exploration activities in the Alaska OCS Region. These procedures must "identify ice conditions, weather, and other constraints under which the exploration activities will either be curtailed or not proceed." Shell's successful response to the large ice floe which encroached upon the Burger A within hours of the commencement of drilling further illustrates the necessity, as well as the effectiveness, of these regulatory requirements and the importance of detailed planning to the conduct of safe exploration drilling on the Alaska OCS.

Regulatory violations. The problems encountered by Shell in 2012 – including significant violations identified during United States Coast Guard's (USCG) inspection of the *Noble Discoverer* drilling rig, the lost tow and grounding of the *Kulluk* rig near Kodiak Island, and violations of air emission permits issued by the Environmental Protection Agency (EPA) – indicate serious deficiencies in Shell's management of contractors, as well as its oversight and execution of operations offshore of Alaska. As Shell's experience in 2012 makes clear, the waters off Alaska present myriad challenges and dangers during every phase of an offshore operation. A significant accident or spill in the remote and inhospitable Alaskan Arctic could have catastrophic consequences on fragile ecosystems and the people who depend on the ocean for subsistence. For these reasons, DOI's 60-Day Report presented seven key principles that are fundamental to safe and responsible offshore oil and gas operations in the uniquely challenging conditions of the Arctic. The review also identifies specific undertakings expected of Shell before resuming its Arctic offshore program, among these undertaking was the requirement to develop an Integrated Operational Plan and to commission and complete a third-party audit of its Safety and Environmental Management System (SEMS) program. These undertakings are intended to ensure that Shell has learned from its experience in 2012, and has implemented appropriate risk management and assurance processes, particularly surrounding marine operations and contractor management, to significantly reduce the likelihood of a repeat occurrence of these problems.

Mobilization and Demobilization. The near grounding of the *Noble Discoverer* in Dutch Harbor and grounding of the *Kulluk* rig near Kodiak Island appeared to result in part from Shell not employing its internal marine expertise in these situations. Shell has acknowledged the need to better integrate its corporate maritime expertise, which resides in its downstream programs, with its upstream exploration program for the Arctic.

Many of the most significant lessons learned from Shell's experience in 2012 are from the end of the drilling season and the demobilization of the program. Due to a number of factors – including Shell's lack of preparation with respect to the Arctic Containment System (ACS), delays associated with the unpredictability of Arctic ice and weather conditions, and circumstances that extended the drilling blackout during subsistence hunting in the Beaufort Sea into early October – Shell got a very late start on its drilling program in both the Chukchi and Beaufort seas. The late start, and continuing uncertainty about whether Shell would be able to deploy the ACS, put significant internal pressure on Shell to make as much progress as possible with its drilling program at the end of the season, which is not an optimal operating posture.

The lost tow and grounding of the *Kulluk* in late December 2012 was the most dramatic indication of serious deficiencies in Shell's management of contractors, as well as its oversight and execution of operations in the extreme and unpredictable conditions offshore of Alaska. According to members of the maritime industry experienced with Arctic towing operations, tows occur across the Gulf of Alaska year round, and there is nothing inherently unsound about conducting tow operations in this area during winter. However, given the frequency of strong storms and dramatic sea states in this

region, operators should incorporate proper planning, risk assessment, and risk mitigation. All maritime operations should be overseen by an experienced Maritime Assurance Manager and additional precautions, such as the use of multiple towlines, should be taken during winter tow operation.

Issue 32. Arctic Standards Rulemaking

Summary of Comments

(This summary has already been added in other comments)

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- General Public

Response to Comments

Existing regulatory program. DOI evaluates all proposed EPs under a comprehensive OCS oil and gas regulatory program. BOEM reviews all proposed EPs under its existing regulations at 30 CFR Part 550 Subpart B, and only approves those plans which demonstrate compliance with the performance standards at 30 CFR §550.202. These performance standards require, among other things, that the proposed activities:

- Conform with applicable laws, regulations, lease provisions and stipulations
- Are safe
- Do not unreasonably interfere with other uses of the OCS
- Do not cause undue or serious harm or damage to the human, marine, or coastal environment.

BOEM's plan-specific reviews consider the location, timing, and other important aspects of each proposed plan. When considering proposed exploration drilling on the Chukchi Sea, for instance, BOEM considers the plan's adequacy in light of expected challenges related to sea ice conditions, weather, seasonal darkness, marine mammals and other biological resources, subsistence-harvest activities, and other location-specific considerations. BOEM may only approve an EP if it demonstrates the lessee's ability to meet each of the performance standards of 30 CFR §550.202 with respect to each of these considerations.

It should also be understood that approval of an EP is just one step in the authorization of exploration drilling activities under DOI's existing regulatory program. The lessee must also submit an Application for Permit to Drill (APD) for BSEE review and approval. An approved Oil-Spill Response Plan is also required. BSEE reviews APDs and OSRPs on a plan-by-plan basis pursuant to established regulatory standards at 30 CFR Part 250 and Part 254, respectively. BSEE also considers each plan's adequacy in light of location-specific conditions, as described above.

Proposed rulemaking. Though there is currently comprehensive OCS oil and gas regulatory program, DOI engagement with stakeholders as well as lessons learned from Shell's 2012 Arctic OCS drilling program reveal the desirability of establishing new and revised regulatory measures for exploration drilling by vessels and floating drilling rigs on the Chukchi Sea OCS and Beaufort Sea OCS (collectively, "Arctic OCS"). DOI, acting through BOEM and BSEE, therefore proposes to revise and add new requirements to regulations for exploration drilling and related operation on the Arctic OCS. These requirements are to be specifically tailored to the operational and environmental

conditions of the Alaska OCS. These additional exploratory drilling regulations would enhance existing regulations and would be appropriate for a more holistic Arctic OCS oil and gas regulatory framework. The proposed rule is being designed to ensure safe, effective, and responsible exploration of Arctic OCS oil and gas resources, while protecting the marine coastal, and human environments, and Alaska Natives' cultural traditions and access to subsistence resources.

While the Proposed Rule is still being developed and no specific regulatory language has been proposed publicly, DOI has made clear that the proposed rule would be specific to Arctic OCS Region, would codify some specific requirements imposed on Shell as permit conditions, and would account for certain recommendations made by the 60-Day Report. As the Final Second SEIS was going to print, the Proposed Rule was expected to be released shortly. A formal public comment period will follow release of the Proposed Rule and will provide the appropriate forum for comments regarding the contents of the Arctic OCS standards.

Sufficiency of SEIS analysis. The environmental analysis contained within this Final Second SEIS assumes the application of existing rules concerning EP review and approval. It is BOEM's position that the existing regulatory framework – a set of rules already requiring the consideration of Arctic-specific factors in every EP review – is sufficient to ensure safe and environmentally responsible operations on Lease Sale 193 leases. It is not premature to issue the Final Second SEIS or make a decision to affirm, modify or vacate these leases prior to the proposal or finalization of additional rules such as the Arctic OCS standards.

Issue 33. Energy Policy Considerations

Summary of Comments

Many comments expressed opinions on the role, if any, of Chukchi Sea hydrocarbon resources within the nation's energy policy.

Many comments stated that production of Chukchi Sea OCS oil and gas resources would have beneficial effects on the nation's competitiveness and energy security and independence, and would elongate the life of TAPS.

Many comments challenged the need for more hydrocarbons and expressed preferences for other means to meet energy demands, aside from development of offshore resources in the Chukchi Sea. Most of these comments suggested that the Federal Government invest in other energy sources (particularly renewable sources of energy such as solar, wind, geothermal, tidal, etc.) and/or increase its emphasis on energy conservation. Some of these comments questioned whether the production of more oil from the Proposed Action would lower oil prices and thus reduce demand for renewable energy. Further, many of these comments suggested that renewable energy is an emerging industry that can provide good jobs for workers currently in the oil and gas industry, as well as others. Other comments expressed a preference for exhausting onshore oil and gas resources prior to venturing offshore.

Others expressed an interest in the U.S. developing Arctic oil and gas resources in a responsible manner that sets precedent for other Arctic nations.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- Corporations and Industry Groups
- General Public

Response to Comments

While national issues such as energy prices, economics, unemployment rates, dependence on imported energy, etc. are important, they exceed the scope of the environmental analysis in the SEIS. BOEM considers issues related to access to offshore energy supplies during development of each Five-Year Leasing Program. International policy issues are also beyond the scope of this analysis.

Comments asserting a preference for other energy sources are similarly beyond the scope of the current analysis. In accordance with the Court of Appeals opinion and ensuring District Court remand, the SEIS provides in-depth environmental analysis of a high case of oil and production, assuming that oil and gas production occurs. While renewable energy sources currently play a role in meeting energy demands in this country, and will continue to do so in the future, such sources could not replace the energy supplied by oil and gas in the OCS. The DOI and BOEM continue to move forward on renewable energy. More information on the OCS Renewable Energy Program is available at http://www.BOEM.gov/offshore//htm.

Issue 34. International Issues

Summary of Comments

Many comments raised international or geopolitical issues. Some comments referenced the U.S.'s upcoming chairmanship of the Arctic Council and recommended specific policies to be pursued. Some suggested that allowing drilling on the Arctic OCS would undermine the U.S.'s credibility in that forum. Other comments stated that allowing development and production of Chukchi Sea oil would violate U.S. foreign policy concerning climate change. Finally, some comments raised the prospect of other countries drilling in their Arctic water and suggested that the U.S. should both lead by example in terms of responsible drilling and also take steps to prepare for an international oil spill that reaches U.S. waters and coasts.

Source of Comments

- Tribal Governments and Alaska Native Organizations
- State and Local Governments
- Environmental Organizations
- General Public

Response to Comments

Issues pertaining to international diplomacy are outside the scope of the Final Second SEIS, which focuses on identifying and explaining the potential environmental effects of the Proposed Action, which is to affirm Lease Sale 193 and all of the leases issued as a result of the sale.

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APPENDIX E – Section 2

Public Hearing Transcripts

Kotzebue

Point Hope

Wainwright

Anchorage

Barrow

Fairbanks

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PUBLIC HEARING
FOR
193 REMAND - CHUKCHI SEA

BUREAU OF OCEAN ENERGY MANAGEMENT

Kotzebue, Alaska

Taken November 17, 2014
Commencing at 7:07 p.m.

Volume I - Pages 1 - 56, inclusive

Taken at
Northwest Arctic Borough Offices
Kotzebue, Alaska

Reported by:
Mary A. Vavrik, RMR

MIDNIGHT SUN COURT REPORTERS (907) 258-7100

A-P-P-E-A-R-A-N-C-E-S

Bureau of Ocean Energy Management:

Sharon Warren
Deputy Regional Director

Michael Haller
Tribal and Community Liaison

Michael Routhier
Management Analyst

Betty Lau
Chief of Resource and Economic Analysis Section

Frances Mann
Section Chief of Environmental Analysis Section

Heather Crowley
Studies Plan Coordinator

For U.S. Department of the Interior, Office of the Regional Solicitor:

Elizabeth Gobeski
Attorney Advisor

Taken by: Mary A. Vavrik, RMR

BE IT KNOWN that the aforementioned proceedings were taken at the time and place duly noted on the title page, before Mary A. Vavrik, Registered Merit Reporter and Notary Public within and for the State of Alaska.

P-R-O-C-E-E-D-I-N-G-S

MR. MICHAEL HALLER: We are going to begin. We would like to welcome you to your public hearing tonight, but before we begin, we would like Judy to offer an invocation for us, please.

(Invocation offered by Judith Stein.)

MR. MICHAEL HALLER: Thank you, everyone. I'd like to introduce the Deputy Regional Director for Bureau of Ocean Energy Management, Alaska Region, Sharon Warren.

MS. SHARON WARREN: Thank you for having us here tonight for this public hearing. Thank you for the opening up of the meeting as far as prayer.

And so we are on record now. Mary Vavrik is here. She's a court reporter, so she will be putting stuff on the record so that we can get your information as we go through this and want to see your views.

We do have a PowerPoint presentation, but before we go into that, I want to introduce the team that's here from the Bureau of Ocean Energy Management, as well as the Department of Interior. As you know, Michael Haller introduced me as Sharon Warren. I am the Deputy Regional Director for the Anchorage office here. Michael Haller is our tribal and community liaison. He does a lot of the outreach with the tribes and the communities, as well.

We have Betty Lau. She's one of our section chiefs. She was the person who was heavily involved in writing the new exploration and development scenario that's in the Supplemental Environmental Impact Statement. Michael Routhier, he's the project manager of this. Many of you may have recognized Michael. Both him and I were up here on the last go-around on the last supplemental, so we're returning on the second one. We have Frances Mann. She is the section chief in environmental analysis. A lot of her employees, subject matter experts, were involved in writing the analysis in this document.

Then we have Heather Crowley. She is in our environmental science management section. She is the environmental studies coordinator, and so she has a wealth of information on the research that the Bureau of Ocean Energy Management has done in Alaska. Then we have Elizabeth Gobeski, and she's with the Department of the Interior Regional Solicitor's Office, andb she's here to listen, as well.

Again, this is our time to listen to you and your views and concerns, but I want to start off with Mike Routhier, who is going to walk us through this. We are here for the public hearing of the Chukchi Sea OCS Oil and Gas Lease Sale 193. So this is the first stage -- or the second stage in the OCS Lands Act process so we have a

lease sale. So Mike will explain what we are doing, how we got here, and what we would like to hear from you.

And after the presentation, since there is just not very many of us here, what we can do is kind of come in kind of like a circle. And this is what we have done in the past. And people can just go along and talk, rather than come up to a mike and testify, so to speak. And we can just go around the circle and you can say what you want to say until you don't have anything more to say on it. And we will capture it all on the record.

So with that, Mike and Betty, if you could come up and began the presentation.

MR. MIKE ROUTHIER: Okay. Well, as Sharon said, we are here to provide a little presentation regarding an environmental analysis document we prepared for Lease Sale 193. So by way of introduction, we are the Bureau of Ocean Energy Management, or BOEM, B-O-E-M. We are a federal agency. We are in the Department of the Interior. We are here to talk about that document we prepared, and we are also here to get your comments on the document and on what we presented.

This slide provides a little bit of background information about BOEM, the agency. The primary responsibility of our agency is to manage the energy and mineral resources on the Outer Continental Shelf. And

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what that is, the Outer Continental Shelf is from about three miles to 200 miles off of Alaska, federal waters.

The agency goes about that mission by doing several things. We implement a five-year oil and gas leasing program that assesses what areas of the country might be suitable for leasing. We then review any exploration or development and production plans that the agency might receive. We conduct environmental analysis of all plans. We conduct a lot of our own environmental studies to learn more about the OCS and its resources, whether they are environmental or social. And we evaluate resources, so how much oil or how much gas might be out there on the OCS. And we collect a lot of data.

So our mandate comes from something called the Outer Continental Shelf Lands Act that is a federal statute, and that creates this four-step process that our agency goes through, versus five-year program. Then we plan for specific lease sales, individual lease sales. If leases are sold and the company wants to explore those leases, then they submit an exploration plan, and we would review that plan. And if it meets the criteria, the standards that we have, then we may approve that plan. And if the company were to find something on their leases, then they would be eligible to submit a development and production plan. And again, that would undergo a lot of

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environmental review, and we would approve it only if it met our standards, our regulatory criteria.

So now we will provide a little bit of background information on Lease Sale 193, the specific project we are here to talk about tonight. It all started back in 2007 when the agency prepared an Environmental Impact Statement to analyze what might happen if the government were to sell leases in the Chukchi Sea. Lease Sale 193 was held in 2008, and many -- almost 500 leases were sold.

In 2010 the agency prepared a Supplemental Environmental Impact Statement, and you may remember we had a meeting in this very room to discuss that document. And that was to address a District Court remand. Alaska District Court found a deficiency in that 2007 document, and we tried to correct it in that Supplemental EIS. Eventually the District Court dismissed the case, but then the plaintiffs in the litigation, they appealed to the Ninth Circuit Court of Appeals.

So that appeal I just mentioned raised two issues. One concerned missing information. That was an issue that we addressed in that 2011 supplemental document that we were here a couple years ago to talk about. And it also raised or appealed the issue of the scenario that the 2007 document was based on.

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Like I said, we conducted environmental review to analyze potential effects from leasing. That review was based on a hypothetical scenario; in other words, what types of oil and gas activities might occur if there were leasing, what exploration activities might occur, what kind of development might occur, what kind of production might occur.

More specifically, that 2007 document analyzed a one-billion-barrel exploration and development scenario. And this billion barrels was used because it was the minimum field size that the agency at the time felt would be required to support development; in other words, to be worthwhile for a company to want to go ahead with development.

And the Ninth Circuit Court of Appeals found that that one-billion-barrel scenario was a deficiency with that 2007 document. The document raised -- or they acknowledged that, yeah, if that first one-billion-barrel field were to be developed, then more development could follow, but that document didn't analyze the environmental effects of any subsequent development. They didn't say, okay, well, what about these later fields that might come on-line. They didn't analyze that. And the Court of Appeals said that was wrong, and it instructed the agency to go back and do more analysis.

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So that's why we are here tonight is we are correcting that deficiency by preparing another environmental review document, the Second Supplemental Environmental Impact Statement. And what this document does is it analyzes the environmental effects associated with a bigger scenario, a larger amount of production, more specifically 4.3 billion barrels of oil, along with 2.2 trillion cubic feet of natural gas.

As we said about developing this document, we wanted to enlist the help of other agencies or governmental entities with expertise in the area. So we were fortunate to have several cooperating agencies. Those include the Bureau of Safety and Environmental Enforcement, or BSEE; the Bureau of Land Management, BLM; State of Alaska; and North Slope Borough and Northwest Arctic Borough; and also several other agencies who are participating agencies in that they also helped us develop this document: EPA, Fish & Wildlife Service, NMFS, the Coast Guard and the federal coordinator for the Alaska Natural Gas Transportation Project.

So this Second Supplemental EIS, it's a NEPA document, and as such it analyzes different alternatives. In this case it analyzes four alternatives, including the Alternative IV, Corridor II deferral alternative that was selected in 2008. But what's really important to

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understand is that no new areas would be offered for lease as a result of this process. We are just re-evaluating the decision in 2008 to hold the lease sale. So there won't be any new leases.

This map here depicts the existing sale 193 leases. And those are what -- those leases are what's at issue here, whether to confirm those leases or modify them, modify them in some way or to vacate the lease sale.

I'm going to turn it over to Betty for a moment here. Betty was a primary author of that development and production scenario that I mentioned before.

MS. BETTY LAU: Okay. This triangle explains a little bit about how we calculate the potential reserves in the Chukchi Sea planning area. If you look at -- if we looked at everything all over the Chukchi and in any kind of reserves at all available by any means, we would have 8,500 potential prospects. But of those, when you start getting down to it, how much of that is really technically recoverable? Well, it shrinks down to 1,400 pools and 15.4 billion barrels. Now, we are talking about everything in the Chukchi.

Then if you look at, well, what could you economically produce at $110 a barrel, which I don't know if you watch the price of oil; that's not what it is these days. It's down to about 80. But we have 11.5 billion

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barrels. So you can see it keeps shrinking as we go down. So then we took a look at what might be available in the leased area if we talked about a big anchor, a big satellite and then two subsequent satellites being developed. Because you found that big anchor, all the -- you know, the leases that don't get developed go away after ten years unless they are being developed. The operators have to ask for an extension of that time.

So we are assuming that if you have one big field, then maybe you could bring in some other smaller fields with a later lease sale. So adding all those together, we are getting 6.4 billion barrels. And the ones that are just associated with 193 are one anchor, which is the big one, and one satellite, and total 4.3 billion.

So that's -- that's the process we go through with our geology and economic analysis. So we came up with a number of 4.3 billion barrels as the maximum we could develop based on just this one sale.

So here is the breakdown of it. You have got your anchor field that has 2.9 billion barrels. You have got a satellite of 1.4 billion barrels. And associated with those two oil fields are 2.2 trillion cubic feet of natural gas. And it takes -- because we have to -- we would -- my assumption is you produce the oil first. And

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while you are producing oil, you reinject the gas into the reservoir and then you produce that same -- similarly to what they have done at Prudhoe, produce the gas after the oil is depleted. And that reinjection of the gas postpones it till -- you know, until we -- they get a new pipeline through from Prudhoe down to southern Alaska. And it also keeps up the pressure in the reservoir and improves your oil production.

So it's 77 years. It's a long time, partly because you have two phases. You have got oil production and you have got gas production afterward.

And the four phases are exploration where they go out and, you know, do their seismic, drill a well here. We have had 13 wells so far in the Chukchi Sea, and none of them has been a commercial success.

Then you -- if you find something, then you develop it, you put in the pipeline using the platforms that it would take to produce the oil and gas. You produce it. And then we include it as the last step, decommissioning, cleaning up after you are done, taking things out, making sure that things are put back.

So we are assuming that both oil and gas are going to be transported to market by pipeline, by carrier ship.

MR. MIKE ROUTHIER: So after Betty's group

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constructed this hypothetical scenario, it's then turned over to people that work in Fran's shop, which are biologists and oceanographers and other subject matter experts, in order for them to assess what sort of effects might occur from those activities that Betty described. In doing this analysis, we consider new information, so the most recent studies and reports, most of which was funded by our agency. We identified impact-producing factors or those aspects of the activities that could have effects on the environment.

Then we tracked the impacts of this scenario through time. So we walk the reader through the 77 years that would be required for this level of development and production to unfold.

We do an oil spill risk analysis. And for the purposes of this document, we are assuming that two large oil spills would occur. Those are a 5,100-barrel platform spill and a 1,700-barrel spill from a pipeline. The assumption of two is a little bit more than the statistics indicate, but we wanted to make sure that we captured all the potential impacts.

The document also updates the hypothetical very large oil spill analysis. That's something that we did originally in the 2011 NEPA document we were up here previously to talk about. That analysis is also in this

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document in an updated version, so we wanted to include that to make sure the decisionmaker understood the effects associated with this very low probability but very high impacts event.

The other thing that we do in this NEPA document is analyze cumulative impacts. That's the actions' contribution to effects from other actions and other things that are going on, whether that be climate change, other types of development, tourism, vessel traffic, aircraft traffic, all the other things that are happening in this region. We really want to make sure we understand how impacts from the oil and gas activities we described in the scenario might interact with those other types of impacts.

So where do we go from here? We released the document a couple weeks ago. We are currently in this 45-day public comment period, and that closes December 22nd. After that comment period closes, we will look at all the comments we received. We will look at input we get at meetings like this one here tonight. And we will respond to the comments, whether by revising the text of the document or in a more straightforward response to comments form that we will include as an appendix in the final document.

And eventually when we are done revising, we

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will release the final Second SEIS. And we expect to do that in late February of 2015. And then 30 days later, the Secretary of the Interior, who is the decisionmaker here, can issue a Record of Decision. Basically she can make a decision on whether to affirm, modify or vacate Lease Sale 193. So we expect that that would happen in March 2015.

So submitting your comments. You can provide your comments here. And after this brief presentation concludes, we will chat more informally about any comments that people might have. Or you can submit your comments through regulations.gov. That is a common theme portal on the Internet that the government provides. So you go to this website right here, and you can read some documents pertaining to this project. You can look at other people's comments that have been posted on-line, and then you can submit your own comments on the document.

And what we are really looking for -- I mean, we consider all the comments we get, but what we're really looking for are substantive comments on the document. So you forgot to analyze this, or we saw that you analyzed that, but you didn't really get it right, so here are some things that you should consider. Here is our point of view about what those impacts might be. Those are probably the most useful comments as we go back and revise

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what we have done so far and eventually issue the final document.

That's it.

MS. SHARON WARREN: Thank you, Mike and Betty, for that presentation. On the table we have a handout concerning regulations.gov and how you can get to the portal from the instructions on how to do that. So we have that at the table. Also on the table we have a few disks of the document. So if you don't have a hard copy of it, we do have some of those available here tonight. If you want it on a computer disk, we have those also here tonight. We also have on the table some of the Arctic research information that we have done. Again, Heather Crowley is our coordinator of environmental studies program, so she will be able to -- after the meeting if you have got specific questions on the environmental studies that we have done, we have that information.

So what I would like to offer now is if we want to just take a short break and kind of put the room in kind of like a circle so people can go around and we can talk. If you have got some general questions -- we are not going to get in a dialogue or debate, but if you have got some questions that we can answer tonight to better inform you so that you can make comments on the document, we would certainly do that, as well, because we would

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like -- like I said, we would like to have your views and all on the document.

I know there is -- it's a lot of information that we went through. And so it's a very different document than we had before. And so we would be more than happy to answer some general questions to help you understand the document and what's in it and so that you can formulate your comments.

So I'm going to go off record right now, and then we can kind of put the room around and we can discuss things, if that's fine with you.

(Off the record.)

MS. SHARON WARREN: Again, this is the public hearing for the Chukchi Sea 193 lease sale. We do need to make one correction. So if I can have Betty correct a number, that would be great, for the record.

MS. BETTY LAU: I misspoke. Sorry about that. It's my first presentation. I said there were 13 exploratory wells in the Chukchi Sea. There have only been five to date. But I was right about all of them not being commercial successes yet.

MS. SHARON WARREN: So if we want to just start going around and listening, if you have got some general questions, we are here to listen. Mary will be taking down your concerns, your questions. And if they

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are general enough, we can answer them. I'll open up the floor.

MR. EARL KINGIK: My name is Earl Kingik. I come from Point Hope. I have been going to these kind of meetings for the last ten years. And seems like we are not getting anywhere. We are not attracting -- our people aren't getting attracted. That book you see over there, our people are never going to take a look at it. How can we improve this? How can we make our people understand and them go to these meetings and make sure they understand what's in that big booklet? Because we don't even know what's inside that booklet.

Like the high school students asked me today, what will happen if there is an oil spill or there is a walrus haul-out, 53,000 walruses with oil on them. What will we do? Are we just going to look at them? I couldn't answer that. Maybe you guys could answer that, maybe this guy, on that oil spill. If there is 53,000 walruses got oil on them, what are we going to do?

MR. MIKE ROUTHIER: Well, I can't -- I can't address that too specifically in that I'm not the expert on that issue. What I can tell you is that before any company is allowed to do any drilling or any activities that might cause an oil spill, they are required to submit an oil spill response plan. And that's

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something our sister agency, BSEE, the Bureau of Safety and Environmental Enforcement, looks at. And they have some standards in their regulations. And their job is to make sure that the company has adequately planned for the possibility of an oil spill. And our agency helps out with that, too.

For instance, we have geologists who look at the characteristics of the well being drilled, and they assess how much oil is capable of spilling from this well, and they give that information to BSEE, and then BSEE makes sure that the company has enough assets on hand to try to address that spill.

We all know that responding to the spill would be a huge challenge up here. No one is trying to minimize that. But that's the answer we could provide you here tonight is that, you know, that is something that the federal government takes very seriously and something that the federal government looks at. And there is a lot of review prior to any activities, any drilling being approved. And we hope that, you know, events like that would be properly considered when they do those reviews.

MR. EARL KINGIK: My name is Earl Kingik. I work for Alaska Wilderness League under the Environmental Justice Division, and I travel to all the villages. I try to travel to all the schools and talk

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about this kind of stuff these people are bringing in. A majority of time I go to these public hearings or public comments, maybe there might be five people. One time I was here, I was the only one at the high school, only person. And I was sad. It really hurt my heart because people in Kotzebue love to hunt belugas and all the other animals. They love to eat their fish. And I was wondering, how come?

So my first thing was how can we improve where we can get people attracted to these kind of activities like what the government is trying to do in our area. How can we make it work better? I use my fliers like this, you know. I use fliers like this to try to get people involved in what we can do to improve and how could we make our people make comments. How can we do that? How can we help them?

And I had a chance to work with the North Slope Borough lawyers to help collect comments from people, you know, going to villages so we try to get as much comments going. Because we only got 45 days. Forty-five days is such a short time. Look. It was November. It's almost Thanksgiving. Time goes by so fast, and we only got 45 days. How can we improve this? Radio station? Newspaper? When I see the newspaper ads, never really explain what this is going to be about, you know. I

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should have brought my Arctic Sounder with your guys' ad.

MS. SHARON WARREN: Right. We had ads in the Arctic Sounder.

MR. EARL KINGIK: Our people don't understand that kind of language, you know. We got to make it where we will be able to understand. And our people don't really pick up the newspaper and go through the ads. But radio station is the best way. The best way to attract our people is radio station because everybody listen to radio. It was good to hear on Channel 2 News that you guys were going to be in Kotzebue tonight. It was good to hear on Channel 2 News that you guys are going to be in Point Hope tomorrow and Wainwright.

MS. CINDY FIELDS: That's how I found out.

MS. KARMEN MONIGOLD: I know. I rushed over here.

MR. EARL KINGIK: We need to try to improve it to where we can get our people attracted because this is a very hot subject for our people, you know. We are part of the ecosystem. Without them we can't live. Without them we cannot keep our people united. But I'm trying to figure out how can we let the government improve the comment period, get them more comments so when they send the comments to Washington,

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D.C., hopefully I'll be able to take 3,000 instead of 25.

MS. KARMEN MONIGOLD: My name is Karmen Monigold. I'm from Kotzebue. I wanted to kind of go off of what he said. I have been to one meeting before, and I had only heard about it, you know, that day. I mean, I just heard about this an hour, you know, before it started, and I rushed over here. And the same that I had -- the same feeling I had back then when I first went to the meeting was that supplemental -- I mean, it's a thick book, but it's only a supplemental of the -- how many volumes is it that's written? And they are -- you know, our people aren't going to go page by page by page.

And so while I appreciate you guys coming here to get our comments, we don't know what we are commenting on. You know, all we know, all we understand is we need to protect our resources. We need to protect our land, our ocean for our children. I brought my son here today. I asked him if he wanted to come. I said, you have to start paying attention because that affects your food. That affects your future. That affects your children and your grandchildren. Seventy-seven years. You are going to be how old in 77 years? You are going to be an old fart.

So my point is, you know, when we don't even understand -- I mean, I'm sitting here looking at this,

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and we have -- I mean, if you are going to come to our communities, what we want to hear about is we want to hear about response. Where is the infrastructure that's going to protect our resources, our animals, our land, our fish? You know, just exactly what he said because we -- we rely on those. Those fill our souls. They are not just our food. Those are part of our culture. We are part of their culture. I mean, you know, we are all connected. So even though this is way up north, that still effects our people down -- you know, further down here.

And when you look at the oil spill off of, was it Louisiana, I mean, that's in waters that don't freeze. What the heck are we going to do up here when we -- you know, we freeze? I mean, we are not freezing as much as we would like to anymore, but we do freeze eventually, you know.

And so when we find out about one hour before and then you bring that booklet, I haven't read that booklet, same as last time. I didn't read the other booklet because they are so thick and so overwhelming. And I have some forms of education, and I look at that book and I'm, like, seriously?

All I want to know is who is going to be here to protect our resources for our people if you guys start -- I mean, if they start offshore drilling. You know, there

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is five wells out there already. What if something went wrong and the closest place is, what, Dutch Harbor, you know, to go up there to stop a spill? I mean, the closest place is Dutch Harbor, I believe. You know, by then all of our animals are wiped out. We are having a hard enough time with climate change that having offshore drilling right now, it's like putting the cart before the horse. You are selling leases before you even know how you are going to protect our people. And that's all we care about is how you are going to protect our resources.

Thank you.

MR. WILBUR KARMUN, JR.: Wilbur Karmun. I'm here on behalf of Kotzebue IRA. I've attended quite a few meetings at the hotel here and over at the IRA. And speaking with Shell and other entities, we have discussed about having oil response barges out here in Kotzebue Sound, support ships for the oil industry. And we also discussed about getting to the communities along the coast like Deering, Shishmaref, Kivalina, Point Hope.

And my concern is what we are all expressing tonight. And I'd like to see the -- see you folks and the oil industry -- I'd like to see a larger meeting, maybe a larger notice ahead of time and get more people together and hear -- hear the concerns like we hear tonight.

And I really appreciate you folks coming out

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tonight. I just found out on Channel 2 News that you guys were going to be here.

MS. SHARON WARREN: So you didn't listen to the radio today when I was on the radio with Mike?

MR. WILBUR KARMUN, JR.: I was in jury duty all day.

MS. SHARON WARREN: Oh, jury duty. Okay.

MR. WILBUR KARMUN, JR: I sit on the radio Kotz board, so I usually listen to the radio at work, but today I was in jury. But I really appreciate you guys coming out and listening to what we have to say. I mean, we do have grave concerns. And I like the ideas of having the oil response barges sitting here, which is a little -- which is a lot closer than down south like she mentioned, like Karmen mentioned. I think we really need to work hard to educate the folks up here.

And thank you.

MS. SHARON WARREN: Yeah, what we have here tonight is about the lease sale. And of course, that leads into -- I'm sure there would be exploration, and I know Shell is out there and, like you said, the barges and everything else. And that's -- you know, after the decision is made on the -- should the decision be made to, you know, keep the lease sale, then the next step will be any exploration plans. And those do come into our office

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for review. And we do look at them.

As you are saying, where is the place that should be staged? What assets or ships, vessels, everything else should be required for the companies to bring with them, you know, relief rigs so should there be an uncontrolled event of oil, you know, where is the closest relief rig that they can come in.? So all that comes after this decision that we are -- that we are wanting to -- all those concerns go into our document because that's part of the exploration and development scenario because we are looking at that.

So I think it's very, very good to hear from all of you tonight concerning the concerns of an oil spill, the concerns of how is that protection going to happen. You know, that's -- one thing we don't want is an oil spill. Even with us living in Anchorage, we don't want that, as well. So it's kind of like what is there -- you guys are on the front lines, so to speak, and how can, you know, the protection happen. So hearing that is very good, as well.

You know, you say, like, you know, what kind of comments to offer. You know, there is -- in the document we talk about subsistence, you know, and subsistence way of life. And so anything that you can provide us of -- if we say that you subsistence hunt out to 40 miles, is that

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accurate? You know, some of those things that you know -- because the document is -- it's a lot to read and everything else. But sometimes if you can break it down to those areas that you know a lot about -- you know, in the table of contents maybe just go to those areas that you know a lot about and is really the focus of your concerns and focus on that so you are not necessarily looking at 400, 500 pages. You know, take a look at the table of contents and see if there is something in there that when you are looking at it and if you have got questions on it, we would be more than happy to answer them and everything else.

But what I'm hearing tonight is information we need to hear and the concerns because that is very important to us.

MS. KARMEN MONIGOLD: So on these disks, that's just the supplemental, the Second Supplemental, right? Where do we go to get the full, you know, document of the 800 million pages?

MR. MIKE ROUTHIER: We do have those on our website, the 2007 document and then the 2011 document. That said, even though, you know, this is a supplement, like you said, our goal was to make it as self sufficient as possible. So we wanted to make something that really stands up on its own and is comprehensive. And it

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actually analyzes the much larger scenario, so it's actually in that sense bigger than the other documents. And I feel like you could probably just look at this one. And there might be some references back to sections of other documents, but overall this new document should really stand on its own and cover things.

MS. KARMEN MONIGOLD: And then the second question I have is, on one of the slides it showed the Northwest Arctic Borough and the North Slope Borough were a part of this.

MS. SHARON WARREN: Correct.

MS. KARMEN MONIGOLD: Which brings me back to your question about how we get these out to our people. And it sounds like our boroughs should be educating. Our borough assembly members, if they are a part of this, they are the ones that should be letting us know as a community.

MS. CINDY FIELDS: Not just collecting a per diem.

MS. SHARON WARREN: All the meetings with the cooperating agencies were by teleconference, so -- because of the time that things we are doing. And so we did look towards like the Northwest Arctic Borough and the North Slope Borough. They did look at the document before it was even out to the public to see if some of the

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information we had in there was correct and if there was some things that we needed that we didn't know about and everything else. So they helped us in that aspect.

And so I saw that they helped us. You know, it's not -- I don't want people to think, you know, a for or against or anything else. It was more of an assistance of helping us with the factual stuff. So it wasn't like, you know, a cooperating agency or a participating agency, you know, they are totally supportive of the document or not totally supportive of the document. It's just that we asked them for some information and they provided us the information. I hope I captured that correctly, Noah.

MR. NOAH NAYLOR: For us we could do a better job of communicating. We go on the radio every Wednesday. I actually wasn't here these last two Wednesdays for personal and business reasons. Those would have been the times for me to start talking about this meeting that we are having today. And if I were here within those two weeks, I probably would have done a better job of doing that.

But we can still do it. We have so many more days to do it. And I can get on the radio on Wednesday and talk about that we had this meeting, what are your concerns, and probably go about the best way to comment on those concerns because it's not only -- not good enough

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just to have a concern, but you have to know how to comment on it. What section of the -- what section of the draft is out there that you want to comment on? And we sent some information out there. And the information that we gather here today we will also add in our comments at the end of the 40-day comment period.

And then, you know, welcome to comment on -- call on-line while we are at the radio station to talk about this. And getting more people involved is the key, but finding a way for them to understand what's going on is the way to do it and making it something that they can relate to rather than 16 reams of paper that talk about the environmental studies or aquatics or things like that, and then making it a little more easier. We can, I think, all say that subsistence is the most important thing for us. We just have to figure out what part of the document that we are going to be referring to that you can help correct with the EIS.

MS. CINDY FIELDS: I originally grew up in Selawik, but I moved here, and I have been living here for 20, almost 30 years. As a child I grew up coming here every summer with my parents, and they have come for many years from Selawik. And it may not be on the coastline. They are in the river system. And we come here to the coastline to harvest the bearded seal. And that's how

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they have their seal oil. They share with Elders in the community, you know. And the sharing system in the village is there, so they share. Other people -- you know, it just works together where they help each other out.

Now that my parents are -- my father is deceased. My mother is in the elderly home here. Still love to eat it. Will hardly eat White Man food, what we call it. I brought some oiled pike to her with seal oil and black meat. And let me tell you, those Elders just was a magnet to the table, and I just had a little bit, but it all went. Soul food. We talk about soul food. We want fulfillment. And that's kind of scary because it's not just the coastline communities. It's people in the villages, you know.

I know some relatives that come here, hunt the bearded seal and bring it all the way home to Selawik or to Noorvik, camp outside of Noorvik or to Noatak. And it's not just the coastal. It's also people in the river system.

But the importance of the seal oil, you know, it was kind of scary because my husband usually would come -- go out, get the bearded seal and bring it right back and I'd work on it. This year it was -- it's getting harder. Because of our -- the climate change we are going through,

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it's been harder for him to harvest. He didn't go out and come right back and say here it is, you know, not like in the past. Same with caribou. Our climate is just changing so much. And on top of our climate change, we are going to deal with offshore drilling. That's pretty scary. It makes you want to cry because you just never know what's going to happen. It's a scary thought.

MS. JUDITH STEIN: My name is Judith Stein, and I just wanted to know, if we wanted to write a comment -- like tonight he talked about the fish -- that we could do it in writing tonight?

MS. SHARON WARREN: Yes. And we will take it back with us tonight. And then also, you know, what you are saying tonight is captured on the record, so we will have transcripts of this, as well. We will be going through the transcripts and parceling out the different comments that we hear tonight so that we address them. Yes, Judy, you can do that.

MS. KARMEN MONIGOLD: One other comment I wanted to say. I know that we are not commenting on the actual Second SEIS because I won't even look at it until I get home on my computer. So my recommendation would be is to find out how to get it out, you know, to the people before you show up here so that when you do show up here we will have comments on what you want us to comment on

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because none of us have read that book. And I apologize. I wish I could comment -- I could comment smartly on it, but I haven't read it yet, so --

MS. SHARON WARREN: We do have a mailing list. We did mail these documents out to the libraries here. We also have a mailing list so if people -- as time goes on in the future, if you want to give us your address, we can put your name on the mailing list. And we do. We have quite a few people that we have e-mailed this document out across, you know, the whole Alaska area because we try to -- and we do -- either we -- and we don't put them slow boat, so to speak, to the areas. We will either send them express mail or priority mail so you have them pretty much the entire period instead of sending them like parcel post or something like that. We don't do that. But if you want to receive a copy of it in the future -- anything in the future that we have mail-outs and everything else so you can keep yourself abreast of what's going on because there is a lot of activities from time to time -- not all the time, but from time to time, we would be more than happy to do that.

And then what I'm also hearing from everybody is rather than us just come, like, to a public hearing and maybe that's the only time you see us, is for us to be a little bit more on our outreach to come sooner and kind of

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talk about these things ahead of time before you even see a document or anything like that is what I'm hearing from you, that would be helpful.

MS. KARMEN MONIGOLD: It would have been helpful if I read the document before I came so I could have an educated comment on what you want us to comment on. And then I guess my final comment to emphasize is, to me this is putting the cart before the horse. You know, for our communities, we want to know how you are going to protect before you even put one exploratory drill out there. How are you going to be prepared? I had gone to an Alaska dialogue, and it was the same thing. They told me all about offshore drilling. They told me all about the Northwest Passage and the ships that were going to go. And there was a group -- I mean, there were 75 people in this room listening to how great it's going to be, you know. And I'm sitting there just thinking, my whole culture is going to be wiped out.

And when I stood up finally after listening for two hours to these people tell how financially great this is all going to be, I asked them what are you going to do to protect our people. And not one -- I mean, there was a panel of like eight people, and not one of them had an answer. You know, so it's frustrating because you are talking about stuff that our comments that we are

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commenting now won't even go into effect until they actually got those leases, after they've spent millions and billions of dollars to acquire that right to drill, and then they are going to blow smoke up our behinds on how they are going to protect our coast waters.

So I mean, it just seems like it's backwards, you know, in my opinion.

MR. WILBUR KARMUN, JR.: Karmen brought up something. You know, not only we have concerns for drilling and oil spills, but over the years we have been experiencing less and less ice and more commercial shipping. And that -- I'd like to see more also on response times. I was in Wales this August, September, and this is a cruise ship that's heading south going past Wales. This is when I was in Wales. And if there is an accident like in the Mediterranean where that one cruise ship sank, I think we will need probably more response equipment all along the coast. I mean, it's just not oil drilling, but commercial traffic as well that -- I think we need to see more planning, as well, for the increased shipping. That's another concern.

MS. SHARON WARREN: And we do address the increased shipping as part of our cumulative analysis. It's not something that we are involved with with the shipping and everything else, but we do recognize that

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there is increased shipping going on. And so we do the cumulative analysis in this document. That is one of the areas that we have put in there, you know, all the maritime stuff that just adds to effects that -- in addition to ours.

So that is where it's addressed is looking at that very broad what else is out there going on in the environment and other uses of the environment of the Chukchi Sea and who is using it, and there is an increase. And we have heard that from the Marine Exchange and the U.S. Coast Guard and everything else. They have had some reports where the shipping has increased quite a bit.

MR. EARL KINGIK: That's how come you changed your name from MMS to BOEM.

MS. SHARON WARREN: No.

MR. EARL KINGIK: Yeah. I deal with MMS before. I know BOEM.

MS. KARMEN MONIGOLD: Wasn't it BOEMRE? It was MMS and then BOEMRE and now it's BOEM?

MS. SHARON WARREN: We are in three separate agencies now. So Minerals Management was one agency, and we had the offshore. And then they separated us into two agencies, and the Office of Revenue -- Royalty Revenue, Offshore Revenue went to another part of the Department of Interior. And then we were -- that was that

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time -- in fact, when we did the last Supplemental EIS, we were BOEMRE, Borough of Ocean Energy Management, Regulation and Enforcement. So that came out in August of 2011. And then October of 2011 we became two additional agencies: The Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement.

So that's why you see on these documents -- like the first EIS that we did, it was Minerals Management Service, and then the Supplemental EIS that we did, we were the Bureau of Ocean Energy Management, Regulation and Enforcement. And now on this Second Supplemental, we are the Bureau of Ocean Energy Management, but we still have the same mission. We just have a different name.

MS. WANDA BALTAZAR: Wanda Baltazar. I have a comment. Once the exploration you were mentioning, they start to drill, the oil will be shipped out through both? Is that what you said?

MS. BETTY LAU: No, the pipeline.

MS. WANDA BALTAZAR: Through pipelines through the -- up North Slope and then back down using the existing pipeline that's already there?

MS. BETTY LAU: Right.

MS. WANDA BALTAZAR: How would it get from where it is now in the Chukchi up to the pipeline?

MS. BETTY LAU: There would have to be a

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pipeline to the shore and then across to the North Slope.
MS. WANDA BALTAZAR: And then that is separate from the natural gas. Is the natural gas extracted the same way?
MS. BETTY LAU: The natural gas, the oil and water all come out of the ground together. But what we are saying is you wouldn't want to commercially produce the gas for sale at first. You would want to put that gas back down in the ground where it came from. And that would keep the pressure up in the underground area, and it would allow you to produce more oil, which is what they have done at Prudhoe is reinject it. And then at a later point when you wanted to produce that natural gas, then you would bring it up and then pipe it across.
MS. WANDA BALTAZAR: Isn't Barrow using natural gas to heat their homes?
MS. BETTY LAU: Yes, but this is a lot of natural gas. It would be -- it would be more than the local people could find a use for. But, you know, that's -- that's at least what we are -- what we are saying might happen.
MS. WANDA BALTAZAR: And when might this happen?
MS. BETTY LAU: Well, it's -- you know, that happens over the course of our scenario, 77 years.

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And about halfway through you start producing the natural gas for sale.
MS. WANDA BALTAZAR: So once this large document gets submitted -- at the end of the month it goes to 45 days, and then did you say the department -- who did you say signs it within 45 days?
MR. MIKE ROUTHIER: Well, the 45 days is the comment period we are in right now. And then based on the comments that we receive, we are going to revise the document and make a final document. Then 30 days later the Secretary of the Interior can make a decision based on that final document.
MS. WANDA BALTAZAR: Secretary of Interior decides whether we should go ahead and approve this final document?
MR. MIKE ROUTHIER: Right, right.
MS. SHARON WARREN: And the final document is put on our website. We let folks know that it is out there. And that 30 days people can provide comments during that time frame in that 30 days on the final document the same way. It will be through regulations.gov. So when you see the final document, again it's a short time frame. It's just 30 days.
And I think this is probably where you are coming from. If you knew that we sent it out to you right

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away, then you could make comment and see the actual final EIS before through regs.gov. And then the information will go to the Secretary of the Interior, and that's who will sign the Record of Decision to say what the decision is going to be on this lease sale.
Again, the lease sale already happened. It happened in 2008. Leases were issued. And so this is relooking at that decision and whether or not to continue with that decision or not continue with that decision. And so -- and then we will know, you know, sometime in March what that decision will be.
Just so you know, this case is -- I mean, this is in litigation. And so it will go back to the court. So it is an ongoing litigation process. So that even takes time, as well, so --
MS. KARMEN MONIGOLD: So I'm looking at this Arctic environmental research. And it says scheduled for 2015. And some of these research proposals look really, really good, but why is it -- why aren't they doing this before they sell these -- or they approve this? Because, you know, a lot of this information would determine whether or not, you know, what I would believe. I mean, if I knew where the dye is going to go to show where a spill would go, how they are going to -- you know, the freeze-up conditions of the Chukchi Sea, you know,

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these are things we should know before we even mess with that stuff.
MS. HEATHER CROWLEY: I can speak to that a little bit. Those are the studies that we are starting this year. They are -- we have our continuing studies program. We have been focusing very heavily on research in the Chukchi Sea for quite a few years, at least since 2007, 2008 when this lease sale initially was being put together. And we spent millions and millions of dollars. And this sheet that you are looking at right now is showing what we are starting up right now.
So we have a number of -- many ongoing studies out there looking at all of the critters, the whales, the seals, the smaller things, the krill that the whales eat, the water column, different things in the water column, the sediments, heavy metals -- I'm sorry. Not heavy metals, but trace metals in the sediments and the composition of the sediments and also in the water column, just -- there is just so many studies that it's becoming -- the algae, looking at the phytoplankton. All of these studies that we have been working on for many years, this focus sheet is just meant to sort of emphasize the ones we are starting now.
And actually that dye tracer study has already begun, and they actually were out there and they have done

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their first testing with the dye. I can't speak to the results of their first tests. I'm not --

MS. KARMEN MONIGOLD: So if we wanted to find out, you know, the studies you are talking about, is there a place on-line we can go to?

MS. HEATHER CROWLEY: Yes. Every year we publish our Alaska Annual Studies Plan. We just put this out. I have a copy that I can leave here. I was going to share it with Noah.

MR. NOAH NAYLOR: I have it already. Just got it today.

MS. HEATHER CROWLEY: Also we post it every year on our website. And our studies website is really easy to remember. It's www.boem.gov/akstudies, all one word. And there will be a link to this document right at the top of that page. And it lists -- we have little two-page descriptions of every one of our studies that we have currently ongoing, plus the studies that we are planning to start this year. And we actually even have a section of ones that we are thinking about for next year.

MS. KARMEN MONIGOLD: And then does it tell the results of past?

MS. HEATHER CROWLEY: Then we have some other sites. We do post the reports from all of our completed studies on our website also. And on that same

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page down near the bottom there is a link. There is a couple different links. We have them in a couple different places on our website. So all of our study reports are posted up there.

MS. KARMEN MONIGOLD: Thank you.

MR. EARL KINGIK: Did you say 19 what?

MS. HEATHER CROWLEY: Excuse me?

MR. EARL KINGIK: 19 what?

MS. HEATHER CROWLEY: I didn't say 19.

MR. EARL KINGIK: 1990, I heard you. There were some operations before late '80s, you know. And those years we got to see a lot of dead whales. Remember that? A whole bunch of dead whales all the way from Point Lay all the way down to Wales. A lot of dead seals. Seals' hair was coming off and stuff like that. They did seismic operations before. That's how come they found out there is a lot of oil up here. And nobody likes to talk about that because they did some seismic operations before, and we end up seeing a lot of dead gray whales and a lot of seals losing their hair and stuff like that, you know.

I took a skin boat trip from Nome, Alaska to Canada, and all those animals were -- they love to see me. They are there, they are happy. Now we take a boat trip, they take off right away. They take off. They used to go

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right beside us. Nowadays when they hear a motor or something, a loud motor, they take off like they did a little bit on Firecracker. How many whales did they see? Lots of whales. And the scientists say they never see nothing. We got people that are on the ships that watch them. I forget what they call them.

MR. NOAH NAYLOR: Observers.

MR. EARL KINGIK: Observers, yeah. But they did see a lot of whales and stuff like that. And the scientists make reports, maybe we see two today. But might have been they might see maybe 10 or 20, but they write down two. We hear this from the observers, you know.

MS. HEATHER CROWLEY: Yeah. I think different observers have had different counts.

MR. EARL KINGIK: Marine mammal observers. That's what they are called. They did studies before. That's when we find out that oil exploration is no good for us because we were beginning to find dead gray whales. We're seeing seals without any hair. We lose our tomcods for how many years? Slowly our tomcods are coming back again.

MS. HEATHER CROWLEY: I should probably clarify, our studies program actually dates back to the 1970s. We have been doing studies from the 1970s. Our

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focus would shift, so we did do quite a bit of work in the Chukchi in the 1980s, in the '70s and '80s. And then because MMS was not focused on the Chukchi Sea at that time, much of our research was more directed towards the Beaufort Sea during that time, but when the shift -- you know, there was more attention being focused back on the Chukchi, of course our studies also followed suit. So we have been out there for a long time and we have done, you know, a lot of work in the Chukchi over the years. It's just we did have a period of time where we didn't do as much --

MR. EARL KINGIK: I had a chance to go down to Deep Horizon when it happened, and I get to see the operation of our government, and I get to see the operation of our oil companies. They were doing nothing. They were doing nothing for one month. They just watch it. That's how come it's called the largest oil spill in America, the Deep Horizon. You go out there to the ocean, you smell that, you get a headache right away. Your eyes start. It was terrible. We were down there for five days. Lucky the Indians invite us down there, Indians from Florida. So we had a chance to take a look at what would happen if there was a big, large oil spill.

Now we got big words. The government always says, I'll take care of everything. We got a barge out in

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the ocean right now in the Arctic, and nothing is being done about it. Same thing is going to happen if we have an oil spill. Nothing will be done again.

That's why I'm really trying to fight hard to try to get this oil spill -- this offshore thing, you know because in our history, in our stories they say there will be black ice coming from the north. What is that? That's oil coming from the north. Instead of ice it will be oil. It will be a disaster. We don't want that to happen. That's how come I really fight hard -- I tried to read that book. I can't even understand it. I went to school. I can't understand what they are talking about, you know.

We got to figure out a better way to inform our people. You know, information is very important for our people. Without information we would be dead. I don't want to see that happen.

I love to eat my muktuk. I love to eat my walrus. I love to eat my tomcod, even though it's that big, in one bite.

MS. KARMEN MONIGOLD: You better go hooking while you are here. They are bigger.

MR. EARL KINGIK: We got some sheefish already.

MS. FRANCES MANN: I've got a comment for you, Karmen, and everyone else here. And also you, Earl.

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Part of it is so this particular document we are looking for comments on is to affirm the lease sale. But I want to make sure you understand, it's not the only time we do an environmental document on aspects of what could be a development plan out there. So the -- if the lease sale is affirmed, it provides an opportunity for a company to do an exploration plan. And when they do submit plans for that, we review that. We do another environmental document and there is another chance for the public to comment. And if that is successful, if they believe there is recoverable oil out there, they would then submit a development plan. Then we would do another environmental review document.

I agree with you, this is on a pretty abbreviated timeline. Some of that is out of our control. We have got a lawsuit and we are trying to kind of answer different masters, if you will. This is pretty fast. That's not the norm. A normal EIS -- like if there was a development plan, we would do an EIS, and that's, you know, an 18-month period. There is usually a much longer time period to provide comments.

So, you know, we admit to you it's a pretty abbreviated comment period. So that's a little bit out of the norm, but it's a little abnormal because this lease sale was already held. So it's a little bit different.

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But there is other opportunities in the future to look at a specific plan. And then you can get down in more details. One of the problems with this is as a scenario, it's a hypothetical scenario that what could happen. So, you know, it's one of many possibilities, as Betty and others developed. So that by itself kind of makes it a little bit difficult, not specific.

We would expect a very, very specific plan from a company if they said we would like to move forward with a development and production plan, and it would state a lot of those things you might be looking for, which is where are you going to put this sort of equipment? What about that? That will be coming in the eventuality that someone decides to move forward with the development and production plan.

MS. SHARON WARREN: And our environmental studies is always ongoing. We don't stop. We constantly are doing environmental studies so that we have the lease sale stage. And like the next stage would be the exploration stage. And so those studies provide us even more information about specifics of what we really need to look for when we are looking at something very site specific. And that's why we continue to have those studies so that we can further refine what are the protections that we need to make sure are there and

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everything else.

So like Heather said, our studies program -- in fact, we celebrated not too long ago 40 years of environmental studies, and we will continue to do them as long as there is operations out there. There is -- you know, there is production right now that -- in the Beaufort on the Northstar, and there has been studies going on all the time on that of what is anticipated, what it does and everything else. But it is. It's a continual loop when we do environmental studies. And that's why we bring that up tonight to let you know that we are continuing to do studies. And as we find new information, then we make adjustments, adapt to different things of what needs to be done out there. It's not 100 percent. There is no 100 percent guarantee.

MR. WILBUR KARMUN, JR.: One of the things I want to bring up, too, is by January we will be running under new Congress, and I have been paying attention to the news that a lot of the Republicans really want to push for the drilling up here. And I think it would be very important that you folks let Congress know that they can't put the horse before the cart because if Congress really pushes for offshore and ANWR and they don't see the studies that you folks have been doing and the other folks, it's going to really hurt us. So that's something

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that you folks need to pay attention to, as well.

MS. CINDY FIELDS: The cart before the horse.

MR. EARL KINGIK: I'm an NGO, nongovernmental organization, but I do work with organizations that will take people from the tribes to Washington, D.C. to talk about -- like you can tell their boss, they come here, there was only three people and they approved it. You can talk to them like that. Congress likes to listen. They would rather listen to a real person. But every six months we go to Washington, D.C. to go talk about offshore, Pebble Mine and other activities that goes on in Alaska. We take at least maybe 18 tribes from all the 210 tribes. We take 18 people to Washington, D.C. to go tell the story. We don't go lobbying. We go tell the story about our way of life and what we expect to happen now in our area. That's how come we go to -- I work for the tribe and I send tribes to Washington, D.C. I got 16 of them in Washington, D.C. right now on Pebble Mine. It's not only offshore. I do mines, too. I got four I'm working on right now. But my main goal is offshore.

My question earlier before, I need to understand. I'm trying to figure out -- explain one thing. When I first start, MMS first went to Point Hope,

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I work as a wildlife and parks director. Okay? And they called my office. They go, we have a public meeting. They only gave me 42-hour notice. 42-hour notice, and everybody is out whaling. Everybody is doing other things, you know. How can I get people to go to meetings? I took them to the school. I took them to the school. And I let the people like you guys -- before you guys came around, but people you replaced, I let them talk to the students.

Next time they come around, man, I had about 30 parents come to our meeting. Maybe we can do that around here. Maybe you guys go up to the school and talk to the high school students like I did and tell them to tell their parents to go to the meeting. It's important for them. It's their future, you know. It's important. It's your future. Anything bad could happen. But you got to be involved. Even though you are young, you got to get involved right now.

So they went home. Got a meeting at 7:00. Wow, people started coming in. Maybe you guys could set up some kind of meeting at the school. I always -- every time I go to villages, I always make sure I have a gathering at the school to talk about my offshore activity, you know, about my trip to Deep Horizon, my trip to ANWR, my trip to Prudhoe, all these, you know. And the

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students love it. And when the students come home, their parents say, what did you learn in school today? Today Earl Kingik talk about offshore. Yeah. Invite your parents. It works.

When I first have an offshore meeting with Minerals Management Service, there was only five Elders and three teenagers; eight of us. And those Elders hardly could understand English. I had to translate for them. We didn't know how to translate, but I translated for them. I was working as wildlife and parks director. But I think next time you are going to have something like that, you should go up to the school and talk to the students and tell the students to invite their parents for the 7:00 meeting. That's just my recommendation. It worked in my hometown.

MS. SHARON WARREN: We will be at your hometown tomorrow. We will be in Point Hope tomorrow, so we will see how many people are there. We did have a really good showing the last time we were in Point Hope. A lot.

MR. EARL KINGIK: My people are -- my tribal president always makes sure everything is all right. He's the mayor right now, too, but -- how was your guys' tribal government meeting today, government-to-government meeting? You guys get to have

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one?

MS. SHARON WARREN: We are going to come back.

MS. KARMEN MONIGOLD: I've got a recommendation. I don't know if it would help, but when you come out with this type of information, you know, like how you just did a presentation, I mean, that's kind of a quick thing and we are all sitting here like, we didn't read the book. So to have a presentation on what captures that book, you know, maybe more highlighted towards our concerns, which is subsistence, oil spills, you know, what's going to affect us directly so that it -- you know, at the beginning of this 45-day period, we have time to think about, okay, let's now find what page that was or whatever so that we can respond and get more people involved because it's -- you know, now I'm going to be rushing to try to read stuff and trying to figure out what page I've got to go to. And if my computer is not running -- and so that would just be --

Because I have been to some of Shell's presentations, and they have done really well as far as explaining how they are doing on animal studies and --

I've learned more tonight from you guys than I have all the meetings I've gone to about being able to go on-line and look this stuff up. And you know -- and one

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other thing I would recommend is to reach out to the advisory councils, the subsistence advisory because I'm on the Kotzebue Sound Advisory Committee, and while we service for the Fish & Game, we are still there to protect our wildlife for our people. That's our bottom line. And so that could be an avenue. Because like Karmen Daggett [ph], she mass e-mails all of us to let us know what's going on so that we are constantly getting updated on things that are coming down the pipes. And that might be one avenue because I'm sure you guys have them in the North Slope, people that pay attention to what's happening regulation wise.

MR. EARL KINGIK: We have got a radio talk show with KBRW every day at 7:30 to talk about activities of the North Slope offshore and PRA ANWR.

MS. KARMEN MONIGOLD: And Facebook. I mean, who all doesn't check their Facebook?

MS. WANDA BALTAZAR: Thank you very much.

MS. SHARON WARREN: Thank you for coming. Appreciate it.

MR. EARL KINGIK: I make a motion to accept Alternative 2.

MS. KARMEN MONIGOLD: I object.

MR. EARL KINGIK: No action taken. Come back later.

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MR. WILBUR KARMUN, JR.: Thank you.

MS. SHARON WARREN: Are there other comments that you have? So do we want to go off record and call it a night? Okay. Thank you for coming. Thank you for sharing. We have a lot of information. We have got a lot of good things of hearing how better to do it in the future and everything else so that we can have it added to that. So I really appreciate it. And we will definitely take these back and consider them and see how we can improve the process for everybody.

So thank you again.

(Proceedings adjourned at 8:30 p.m.)

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REPORTER'S CERTIFICATE

I, MARY A. VAVRIK, RMR, Notary Public in and for the State of Alaska do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that the proceedings were reported stenographically by me and later transcribed under my direction by computer transcription; that the foregoing is a true record of the proceedings taken at that time; and that I am not a party to nor have I any interest in the outcome of the action herein contained.

IN WITNESS WHEREOF, I have hereunto subscribed my hand and affixed my seal this _____ day of November 2014.

_____
MARY A. VAVRIK,
Registered Merit Reporter
Notary Public for Alaska

My Commission Expires: November 5, 2016

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BE IT KNOWN that the aforementioned proceedings were taken at the time and place duly noted on the title page, before Mary A. Vavrik, Registered Merit Reporter and Notary Public within and for the State of Alaska.

P-R-O-C-E-E-D-I-N-G-S

MR. MICHAEL HALLER: I'd ask Irma to come up and offer a prayer.

(Prayer offered by Irma Hunnert.)

MR. MICHAEL HALLER: I'd like to introduce Dr. Jim Kendall, who is the Regional Director for the Bureau of Ocean Energy Management, also known as BOEM.

DR. JIM KENDALL: Thank you, Michael, and thank you for coming out today. For some of you that may not be familiar with B-O-E-M, BOEM, the Bureau of Ocean Energy Management, we used to be called the Minerals Management Service. So some of you may recognize the term MMS. We are a part of MMS that has been broke out that just does the land management part of oil and gas, you know, exploration and development and leasing.

But before we go any further, let me introduce the team here. I'm Jim Kendall. I'm the Regional Director up here for the state of Alaska. My boss is in Washington. Okay? So I'm basically the highest person in the region in Alaska. I report directly to the big, big, big boss in Washington, D.C.

The next person here is Sharon Warren. Now, Sharon is my deputy. If I get eaten by a polar bear, she's the boss. So she goes wherever I go so she could step right in and take over. And you can see that we are

sort of a team here.

We have got Mike Routhier. Mike. Mike is going to give a presentation when I'm done speaking. He's the project manager about the subject we are going to speak about tonight. And then Fran Mann. Fran, she is a supervisor of the group that's actually producing this Environmental Impact Statement that Mike is going to talk about.

We've got Mike Haller. You met Mike. Mike is back there. Mike is very special because we have offices for BOEM, of course, in headquarters Washington. We've got them in the Gulf of Mexico, in California, and Alaska. But one thing the Department of Interior is very cognizant of is that one-half of all the tribes in the United States are in Alaska. So we were the first region to have our very own tribal liaison, and that's all that Mike does, making sure that we reach out to the tribes to do the right thing. And so he helps coordinate these meetings. Any comments you have got on how we can do this better, please contact Mike, or you can contact Sharon or I.

Okay. Betty Lau. Now, Betty is an engineer. So when we go into this presentation, if you have questions about engineering, Betty is the person to ask.

Heather Crowley. Heather is one of our scientists in our science program. So last time we were

up here, there were questions about science, and we had some of the answers. Then we decided we need to bring somebody from our science side of the house that could get down into some of the weeds, if necessary.

And last, but not least, we have got Liz Gobeski. Now, Liz helps us. She works for the Department of Interior. She's in the Solicitor's Office, and she helps us make sure that we follow the law and everything is where it should be so when we present this document to the Secretary of the Interior, all the right pieces are there.

Now, what are we here for? Mike is going to go into great detail over this, but the bottom line is there was a Lease Sale 193 in 2008. Okay? That is where Shell got the leases in the Chukchi. The courts, the judges looked at it and they said, you know, we really have something in there you need to fix. So they sent it back to us and said, please take this document, it needs to be revised and have a Supplemental Environmental Impact Statement. Okay? So that's what we are here about tonight is a Supplemental EIS to the one that was done probably about 2007 for a 2008 lease sale.

The way we are going to run the meeting after the presentation is, of course, we would invite the Elders to speak first. And we are very pleased tonight to have

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an old friend of ours, Dorcus Rock. Dorcus will help us with any interpretation we need to do. And for some of us that are Yankees, especially from the Northeast, we have a tendency to speak kind of fast. So feel free to tell us either to slow down or speak up or repeat ourself.

This is your meeting. If we don't give you what you need, you can't help us make a better document. So that's what we are here for. The document we are putting together is not a decision document. It's an informational document that Mike will go into. It goes to the Secretary of the Interior. We have to make sure our Secretary, Sally Jewell, has everything she needs, including what you think, in front of her before she makes any decisions.

When we get into the public comment part of the meeting, you know, everybody is going to have a chance to speak, and probably many of you may speak more than once. But let's try to keep, you know, the information or the comments to maybe three minutes at a shot so that everybody has a chance, and then we will circle around. And if you have anything in writing, okay, anything in writing, please provide it to us. And that's going to go to the second-most important person in the room.

You all are the first important people in the room. The second-most important person in the room is our

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dear friend Mary Vavrik, and she's taking all the notes. So when it's your turn to speak, please give your name. If you have any written comments you want to give us, let's give those to Mary. Speak loudly so she can hear you so when we go back we have all these notes that we can look at, go over and make sure the draft document, before it's finalized, okay, has your input in it.

We have to leave tonight about 10:00. So we are going to wrap this up about 9:30ish. But we have got plenty of time for everybody to say something to have a discussion, and maybe even multiple times to say something. And I've probably spoken enough as it is now. So what I'd like to do is I would like to turn it over to Mike Routhier who will start the presentation -- Betty will be helping -- on exactly what the Supplemental Environmental Impact Statement is, why it's important and how it differs from the one we came up and spoke to you about a couple years ago. Okay?

With that, Mike, take it away.

MR. MIKE ROUTHIER: We are going to move this down a little closer so that people can see it a little bit better.

MR. MICHAEL HALLER: Are there any Elders who need a translator that are here? Dorcus is available.

DR. JIM KENDALL: Let's make sure we get

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Jack on the line. Jack, this is Jim Kendall, Regional Director for BOEM. How are you?

MR. JACK SCHAEFER: I'm okay.

DR. JIM KENDALL: We very sorry to hear about your loss. And with that, I'm going to turn it over to Mike Routhier to speak. And I've asked all of my team to speak a little extra loud so that you can hear them on the phone, sir.

MR. JACK SCHAEFER: Okay. Thank you.

DR. JIM KENDALL: You are most welcome.

MR. MIKE ROUTHIER: Okay. Is there anyone who cannot see the presentation?

All right. The document or project that we're here to talk about tonight is the Draft Second Supplemental Environmental Impact Statement, which is a NEPA document. It's an environmental review document. And the decision it concerns is Chukchi Sea OCS Oil and Gas Lease Sale 193.

MR. STEVE OOMITTUK: Excuse me. Can you speak up a little more?

MR. MIKE ROUTHIER: I'll try.

As Dr. Kendall pointed out, we are the Bureau of Ocean Energy Management or B-O-E-M, BOEM. We are a federal agency inside the Department of the Interior. And we're here to talk to you about a document that we

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prepared. And we're here to get your comments on that document.

First I'll talk a little bit about our agency's responsibilities. BOEM's primary responsibilities are managing development of energy and mineral resources on the Outer Continental Shelf, or the OCS. And that's basically the sea floor from three miles out to 200 miles. To do that mission, we implement a five-year oil and gas leasing program where we look at various parts of the country and try to find places that might be suitable for holding lease sales. In those areas we would hold individual lease sales. We conduct environmental reviews and we conduct resource evaluation.

And the important point is that our work follows a four-step process. First is a five-year program. Some of you may be familiar with that term. That's where we identify where we might hold lease sales. Then we plan for the specific lease sales like we did with Lease Sale 193. That's a specific lease sale. Only after the lease sale stage might we get into the exploration plan phase in which a company would submit plans to us and say, hey, we want to drill on this lease, what do you think, we would review that and potentially improve it if it meets our standards.

And only later might we get into the fourth step

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in our process, which is development and production plan approval. That's where a company would propose a plan for developing a resource. And again we would review that plan to see whether it meets our standards.

Here it's interesting. We are actually at the second stage, which is planning for the individual oil and gas lease sale. We are re-evaluating a decision to hold a lease sale, which was Lease Sale 193.

So a little background information on Lease Sale 193. Back in 2007 the agency prepared an Environmental Impact Statement to help the Secretary decide whether to hold a lease sale. In 2008 the agency held a lease sale, Lease Sale 193, and issued 487 leases. Later on in 2010 and 2011 the agency had to prepare a Supplemental Environmental Impact Statement. They had to re-evaluate certain things over again because the District Court here in Alaska said that we didn't do a good enough job the first time.

After we prepared that supplement, we came out to the villages like Point Hope and presented what we did. The District Court said, okay, you fixed the problem. We are going to dismiss the case. However, the plaintiffs in that litigation appealed to the Court of Appeals.

And in that appeal to the Court of Appeals, the plaintiffs raised two issues. One was the missing

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information issue, but they said, you know what? That supplemental document you prepared, that satisfied that issue. You are okay there. But the other issue that was appealed concerned that first document back in 2007, the Environmental Impact Statement that the agency prepared, and it concerned a certain scenario.

So when the agency was describing what type of environmental effects would occur from holding Lease Sale 193, it assumed a one-billion-barrel exploration/development scenario. Basically they analyzed the effects of one billion barrels of development. But the agency also acknowledged that if that first field were to go in, if that first amount of development were to happen, then more could follow, but they didn't analyze the rest of that development.

And the Court of Appeals didn't like that. They said that's a deficiency and you need to correct that deficiency. So that's what we are trying to do now. We are going back and doing more environmental review to try to fix what the Court of Appeals found was wrong.

So this new document contains more analysis and it analyzes a bigger exploration/development scenario. Instead of the one billion that was analyzed previously, we are analyzing 4.3 billion barrels of oil production, along with gas production, too.

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So this analysis is going to be in a NEPA document, an Environmental Impact Statement. When we set about creating this document, we said we could use some help from other agencies and other entities, other government groups. So we have a lot of cooperating agencies that helped us with this document. They include the Bureau of Safety and Environmental Enforcement, or BSEE. It includes the Bureau of Land Management, BLM; the State of Alaska; the North Slope Borough; and the Northwest Arctic Borough. We also had other agencies participate and sort of help us out in certain ways. Those include EPA, Fish & Wildlife Service, NMFS and the Coast Guard.

As a NEPA document, a part of this document is alternatives. We present several alternatives to the decisionmaker for her decision. And it carries forward the same alternatives that have been analyzed in the past. We have the proposed action, having Lease Sale 193. We analyzed a couple of the deferral corridors, and we analyzed the no-sale alternative.

What's important to understand is that no new areas would be offered for lease through this process. We are only looking at the decision to hold the original lease sale. We are not going to be selling any additional leases or leasing in any more areas through this process.

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I mentioned earlier about a new scenario as being an important part of this document, and here is where I'm going to turn it over to Betty, who was the primary author of that new scenario.

MS. BETTY LAU: Okay. When we looked at the --

(Translation by Dorcus Rock.)

MS. BETTY LAU: As Mike said, the reason that we are taking another look at the scenario is because the Court didn't think that the one billion barrels was a big enough volume of produced oil to analyze for our environmental impacts. So we took a completely fresh look, a new look to see what a reasonable volume of oil might be. We started with looking at everything that might be in the Chukchi Sea planning area, which is much more than we ever leased. And when we looked at that, we have maybe 8,500 prospects, which are things that might possibility be drilled.

But then when we looked at of all those, which ones could we actually produce oil with using our technology as it is right now, and that shrinks it right down to 1,400 prospects and 15.4 billion barrels of oil. But that's what you might be able to produce at any price without thinking about economics. So if you think about how much you could produce at $110 a barrel for oil, which

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is what it was when we looked at this -- although the price of oil has gone down -- then it shrinks to 11.5 billion barrels.

But we are not talking about the whole Chukchi. We are looking at just what was leased and what might be produced as a result of this lease sale and what might be produced cumulatively. If this sale were to result in a successful project, then more exploration could happen after that from a different lease sale. So when we looked at that, we got down to 6.4 billion barrels.

But the number we analyzed in detail was the number that would result from this lease sale. This is a statistical number. It's not that we know that this oil is out there. We don't have that kind of information because you have to drill successful wells to learn that. This is based on what we can tell from seismic information and our statistical model. So this is the best we can do with the information we have.

When you look at everything, we came up with a number of 4.3 billion barrels to analyze, which is much larger than the one billion barrels, and we can explain how we got there. We can explain the process that we used to get this number. And that was another important part of the Court's decision.

So then it was my job to say, okay, what if we

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have 4.3 billion barrels; how do we develop that? What do we do -- what would have to happen to make that production? Well, we assumed that you had an anchor field. We think of an anchor field as the one that has to be there. There has to be one big successful field. And then other smaller fields -- yes.

MS. MAE HANK: Could you explain anchor field to me, please?

MS. BETTY LAU: Okay. Yes. That's the big field. That's the main one. And without that anchor field, the smaller fields don't get developed because that anchor field is what brings in -- did that help?

MS. MAE HANK: Explain anchor field. Is it the blockage, the area that was sold, or just the drilling area?

MS. BETTY LAU: It's the -- the reservoir area and how much oil is within that area that will really make a big amount of money for an operator. That's -- that's the really big successful one. So we think of that like an anchor because that's what holds it down. That's what holds it in place. And then once you have got a big field like that, then maybe some other smaller ones will be economic because you have a pipeline, because you have the infrastructure. The things are in place to produce oil. So then you can bring smaller fields. And we call

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those satellites.

MS. MAE HANK: So what if the first drill site does not bring in as much as they thought; would they continue to try to do other wells, other drilling until they find an anchor field?

MS. BETTY LAU: Our assumption is you have got to have that one big one or they won't -- they won't set up a development project. That's what's required.

MS. PEGGY FRANKSON: What if they don't find it with as much as they thought would be there within the first well or the second well of exploratory drilling or the third well; do they -- what number do they stop at until they say, okay, this isn't how much we thought we would find here? Let's stop. There is nothing there.

MS. BETTY LAU: It really depends on the company. That's an internal decision they would have to make.

MR. MIKE ROUTHIER: And that's a very real possibility. In fact, when we did the modeling to produce these statistics, we found that the most likely case is that they wouldn't find anything big enough to justify the development. As you know, it's very expensive to do anything out here. It's very remote, not a lot of infrastructure. So it would take a very, very large field in order to justify the companies spending all that money

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to create infrastructure. In most of the modeling results that didn't happen. But because we need something to analyze in our environmental document, we just assumed that they did find them. So it's a hypothetical scenario.

MS. MAE HANK: So is that based on the satellite field? Is that what you are talking about, where they hypothetically think there is oil in that area based on the satellites?

MS. BETTY LAU: Our geologists gave us a number of less than a ten percent chance of success. That means when they drill a well, they find oil in commercial quantities to be able to produce and make money. So -- but we can't -- so that means statistically, as far as we know right now to our best knowledge, it's unlikely that anything will happen. But we can't analyze the environmental impacts of nothing happening, so we have to have numbers.

MS. MAE HANK: So the satellite field --

MS. BETTY LAU: The satellites are the small ones that might -- if you have got your anchor field and you have got something that produced, you might add another smaller field and you would produce, then, therefore more. But the satellite cannot stand alone.

MS. MAE HANK: Mae Hank, Inupiat Community of the Arctic Slope Tribal Council member.

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MS. BETTY LAU: Just a minute, Earl. There is someone in the back with a question.

MR JIM NASH: What is the deepest depth of -- on seabed where you have exploratory drills? What is the deepest part of the seabed where you have your exploratory wells?

MR. MIKE ROUTHIER: Are you asking how deep the water is or how deep into it --

MR. JIM NASH: Yes.

MR. MIKE ROUTHIER: I believe that all the sites that companies have proposed drilling so far are under 200 feet, like 120.

MR. JIM NASH: So based on your directional drilling, how much money is saved for you not having to drill into the ground when you are putting it straight into the water? How much money is saved on your end?

MR. MIKE ROUTHIER: I don't know. I mean, we are not an oil company, so we are not making or losing money off of any of this. It would be -- that would be a question for the actual operator, your Shell or Conoco or Statoil, someone who owns the leases. I don't have an answer for that.

MR. EARL KINGIK: Is there going to be any horizontal drilling allowed if they don't find any oil out

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there? They drill down, and you would be able to go looking around for the oil.

MR. MIKE ROUTHIER: I don't know. So far no one has proposed to do -- so far no one has proposed to do anything like that yet. We would consider it if we got a proposal for that, but so far no one has proposed doing that. So we haven't analyzed that here.

MR. ELIJAH ROCK, SR.: I was wondering earlier, one of you first men that was up indicated that this is informational gathering. And after that informational gathering, I was wondering how long would you keep that information and go to court and prove to them that what you are saying is something that you have gathered from all the villages. Is this the only village that you are going to to gather the information from?

MR. MIKE ROUTHIER: There are several other places where we are going. We were in Kotzebue last night.

MR. ELIJAH ROCK, SR.: I can't hear you.

MR. MIKE ROUTHIER: We were in Kotzebue last night. We were going to go to Point Lay tomorrow, but they asked us to reschedule. And we will be in Wainwright on Thursday. We will also go to Barrow in a couple weeks and then Fairbanks and Anchorage.

MR. ELIJAH ROCK, SR.: And this

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Environmental Impact Statement is something that I've always been concerned because it really bothers me when you have all the seismic going on and around the area like April, May, April, September when the migrations of the whale is going on through Point Hope and then up to Canada and back around September. And also I want to know if you have any information that you have gathered about our currents from where we are around Point Hope and what time of the year it is going from the east to west, what time of the year it is going from west to east; and also in the other areas like Wainwright, Point Lay, Barrow and Kaktovik, Nuiqsut, is that information already documented in any form on paper?

MR. MIKE ROUTHIER: Our agency has done some studies on that, and I believe we are continuing to do studies. And then my colleague Heather can give you that information about where to find that.

MR. ELIJAH ROCK, SR.: So did you answer my question -- I didn't hear you very well -- about how long it would take you to gather that information and keep it until you go back to court and prove that you have all this information for the impact statements of each community?

MR. MIKE ROUTHIER: Right.

MR. ELIJAH ROCK, SR.: How many months

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from now?

MR. MIKE ROUTHIER: Well, we are in a public comment period right now, and that's going to last for --

MR. ELIJAH ROCK, SR.: How long does that public comment period last?

MR. MIKE ROUTHIER: A little more than a month left in that period, and then we are going to revise this document. Because we are doing it -- we have done a draft so far, but we need to make a final. So we are going to take the comments that we get and use those to revise that document and create a final document. And we plan on releasing that final document in February. And that will permit the Secretary of the Interior to make a decision by March.

MR. ELIJAH ROCK, SR.: Five months?

MS. BETTY LAU: The decision is scheduled for March. The Secretary is scheduled to make a decision in March.

MR. ELIJAH ROCK, SR.: So this is -- what month is it now? November.

MS. BETTY LAU: It's November.

MR. ELIJAH ROCK, SR.: What month would that be if you take it back to court to prove that you have all that information so you can go ahead and do what

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you have to do on the lease sale?
MR. MIKE ROUTHIER: If the Secretary decides to affirm some or all the leases, then we would need to go back to the Court. And I assume that would happen in maybe April or maybe May.
MR. ELIJAH ROCK, SR.: And I was also concerned about when I look at that map there, there is red areas of where -- you know, there has been put up on the map that has not only red; it's got lots of lines on them. What does that indicate?
MS. BETTY LAU: These red areas, are you talking about this [indicating]?
MR. ELIJAH ROCK, SR.: Yes.
MS. BETTY LAU: Okay. This right here are the leases. These are the leases we are talking about. These are the places that have been leased under Lease Sale 193.
MR. ELIJAH ROCK, SR.: Are you talking about the fully red ones on the bottom?
MS. BETTY LAU: Mike, do you want to talk about the deferral?
MR. ELIJAH ROCK, SR.: The place that don't have no line there, the colored red.
MR. MIKE ROUTHIER: Are you talking about these right here [indicating]?

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MR. EARL KINGIK: On your scale you can see the first one. These are red.
MS. BETTY LAU: And these are orange.
MR. ELIJAH ROCK, SR.: And that's what I'm talking about. Is that something that you have already bought?
MR. MIKE ROUTHIER: So all of these blocks that you see, both these orange ones and these red ones, these are the existing leases in the Chukchi Sea. So these were leases that were sold in 2008 during Lease Sale 193. And there is a small difference between the orange ones and the red ones. I mentioned earlier that the NEPA document looks at different alternatives. And a couple of the alternatives are deferral corridors where basically the agency says we don't want to have leases within this area close to shore. And should it be like a 25-mile area from shore? Should it be a 60-mile area from shore? And these red leases right here [indicating], they were sold in 2008 or leased in 2008, but under one of the alternatives in the current document, they might be taken away because --
MS. PEGGY FRANKSON: They are too close.
MR. MIKE ROUTHIER: Because they would be too close to shore, yeah.
MR. ELIJAH ROCK, SR.: Who leased them?

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MR. MIKE ROUTHIER: I don't know. I'm not sure.
MS. MAE HANK: You don't have a list?
MR. MIKE ROUTHIER: I don't know. Yeah. I don't know who leased these ones.
DR. JIM KENDALL: There are several companies that have the rights to those leases, but everything is stopped until we get this work done for the Court. So nothing is going on with those leases until we fulfill our requirement to the Court. And one thing to point out, that deferral area, the 25 miles that was in there, that was based on traditional knowledge from the whaling captains and our science where it showed that's where the bowhead whale was migrating and there were calving areas and feeding areas, and it didn't make sense to have any leases there. That's why it was never offered for lease because it didn't make sense.
MR. STEVE OOMITTUK: Steve Oomittuk, for the record. The lease 193, the 2.6 billion from the 487 leases was -- did they pay for all that already? Did they put up the money right away?
MR. MIKE ROUTHIER: Yes.
MR. STEVE OOMITTUK: You know, you guys submitted the environmental review, the environmental studies. You know, as the Bureau of Ocean Energy

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Management, it said you got the reports over here. You had all these -- you talk about all the whales and the calving areas, but I don't remember seeing those. Are they available now?
And I'm just wondering, all the problems that are going on with these oil companies trying to -- we know everything is stopped right now, but they were planning on coming up with these oil rigs, and they had problems right off the bat. You know, I mean, the Bureau of Ocean Management, they weren't even ready for this. You know, a little bit of wind, and these oil rigs are floating away somewhere. And they are trying to -- you know, it seems --
Are you the management ones that take -- starting from the beginning of with the oil companies that know they are ready to come up north and everything is going to be safe and that -- you know, and then they are having all these problems. You know, are you guys out of Washington, D.C. area or are you guys stationed in Alaska?
DR. JIM KENDALL: Those are great questions, and you are spot on. First of all, all the information that we have, all the science we do is available from our website. I think, Earl, you have been on the website and you have found a lot of our science and the studies. All those previous Environmental Impact

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Statement documents are out there. You are correct. We are the manager.

And remember when Shell drilled in 2012, they were not allowed to go into the oil zone because they promised to have a capping and containment system like they built in the Gulf of Mexico. They built it and it didn't work, and they demonstrated that it didn't work. So we said no. You can drill a top hole, but you cannot get into the oil. And until they have a system that works, they can't go into the oil.

So yes, we are the manager. We are watching them very closely. After they had that problem, we had to do a total review of what Shell did, working with the Coast Guard and the Bureau of Safety and Environmental Enforcement, all the other companies. And sometime by the end of the year this year there will be a document that comes out that has Arctic standards for the companies. And those standards are going to look very similar to the rules we put on Shell, as well as some of the information that came out in the report to the Secretary the following March.

So yes, we are the manager. We are watching everything that's going on. Everything helps us do a better job. And we are making sure that those kind of things are not likely to occur. But you are thinking the

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correct way, sir. Thank you.

MR. EARL KINGIK: Thank you. You guys come out with some good questions. You know, the reason this big thing is going to on, Native Village of Point Hope and NGOs, nongovernmental organizations with the environmental organizations are trying to review the document, a thick document which you never had a chance to take a look at. The Native Village of Point Hope, the Inupiat Community of the Arctic Slope and Native Village of Barrow have joined the environmental organizations and NGOs to try to figure out what's wrong with that impact statement. What is wrong.

Now here they are trying to answer. We went to court, and now they are trying to answer us. These are the questions that the environmental organizations, the Native Village of Point Hope and ICAS have brought to them to do their homework. It's good that you guys come out with these kind of questions, but they have got to make their explanations how it is going to work to make it work better. So this is your chance. I'm happy that we got somebody from the BIA office because you are tribal members. We have got government-to-government working relationship with our friend over here and the Native Village of Point Hope to ensure they continue their presentation, as well as listen to our comments.

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MR. ELIJAH ROCK, SR.: Who are you speaking for Earl, us or the people up --

MR. EARL KINGIK: I'm speaking for NGOs. I work for the nongovernmental organization called Alaska Wilderness League.

MS. LILLIAN AANA LANE: You had made your proposal, your first proposal, and that was denied because you have a low number of barrels, indicated a low number of barrels. You went back. And with the assistance with a satellite --

MS. BETTY LAU: No.

MS. LILLIAN AANA LANE: How did you determine the next number? I know you explained to me, but you can just --

MS. BETTY LAU: Because now we were looking at the results of this sale, we had data from the lease sale itself to help us pinpoint and make a better estimate of the number.

MS. LILLIAN AANA LANE: So you made a better estimate of the number so that you can go in there and actually do the work?

DR. JIM KENDALL: When the document was first done, it was for the entire lease sale. There were no leases. We didn't know where the companies were interested. And this is very different because now we get

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to adjust the document after the lease sale and the companies already have leases, so we know where they are interested. So we can focus our attention down in specific areas. And there has also been more studies done since the 2008 sale. So we have more information. We know exactly where they have the leases, which we didn't have before. So it allows us to focus down and be more precise. It's sort of backwards, but in this case it works in our favor so we can do a better analysis.

MS. LILLIAN AANA LANE: My understanding is that more oil is found in maybe 1,000 feet and more, not so much 1,000 and less. You know, they say that in the news. I read it somewhere that most of your oil, your fine oil is found in 1,000 and more feet, but now you have got 200 feet. There must be something out there that we don't know of.

MR. JIM NASH: They are saving money by not having to drill 200 feet. That's what the companies are trying to do because they have the directional drilling now.

MS. BETTY LAU: When we say 200 feet, we are talking about 200 feet of water. And I think what you are thinking of is 1,000 feet under the ground. But when you have the water and the mud level, and we are talking about deeper in the ground thousands of feet.

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MS. LILLIAN AANA LANE: Oh.
MS. BETTY LAU: Okay?
MS. LILLIAN AANA LANE: Okay. Okay.
MS. MAE HANK: They said the drilling cap didn't work. What was it based on? What didn't work? Was it because of the temperature of our ocean that caused the drilling cap not to work, or was it just dysfunctional, not appropriately built?
MR. MIKE ROUTHIER: Well, our sister agency, the Bureau of Safety and Environmental Enforcement, they are in charge of reviewing the spill response plans, and they were doing their due diligence. And they went down to investigate this new equipment. And it was down near Seattle, Puget Sound. So they went down there to make sure it worked, and it didn't. It failed even down there. So we knew that it wouldn't work up here.
So as Jim said, we didn't let them drill anywhere near close enough down to get into the oil so there couldn't be an oil spill.
MS. MAE HANK: So it wasn't based on temperature? Because the temperature is different from --
DR. JIM KENDALL: It was a faulty engineering design. It was -- they used it in -- down by Seattle. It's not quite as cold as up here. And -- but

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the water was about the same depth, but the engineering didn't quite work right. And so that's when BSEE and the Coast Guard said, no, no, no, no, no. And so we let them drill the top part, but then they had to go back and redesign it. The Bureau of Safety and Environmental Enforcement with their friends the Coast Guard looked at it and they got it to work. But still it hasn't been decided if they can drill or not. We still have to finish this for the Court. But we watch them every step along the way.
MS. BETTY LAU: Okay. Now, looking at our new number of 4.3 billion barrels of oil, the way that I set up this scenario -- and I had to look at how many wells would that take, how many platforms. I was working to try to figure out exactly how you would make that work. How can you produce 4.3 billion barrels of oil? And because of the experience with Prudhoe where they produce the oil -- you know, the oil, the water and the natural gas all come up together. But at Prudhoe they are separating the water and the natural gas and they are putting that back down in the reservoir and they are not producing that yet.
And of course, I'm sure you are aware of the proposal for the pipeline for gas to go from Prudhoe down to Southcentral Alaska to sell natural gas.

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So at this point we don't have a market for natural gas here. We don't have a way to get it to a market. And we are talking about a lot of natural gas.
So the way I set up the plan was to produce the oil first as they do in Prudhoe, reinject the water and the natural gas, and then after that pipeline has enough room, enough place for the natural gas from the Chukchi Sea, build a pipeline across to Prudhoe and ship it through that pipeline. So everything is pipelines.
MR. JIM NASH: How much natural gas is burned off every year in Prudhoe?
MS. BETTY LAU: You are right. They -- they do have a lot of that. But they still have 35 trillion cubic feet to be shipped. But a lot of it is -- they are reinjecting it into the ground.
MR. JIM NASH: But they also burn off a lot with their flares at the central processing facilities.
MS. BETTY LAU: They do. You are absolutely right about that.
MR. ELIJAH ROCK, SR.: Do you have any idea how many years from now what you are talking about will be available to each -- every village or states for -- like you go to a service station and buy whatever you need like gas or oil? How many years from now?

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MS. BETTY LAU: I can't predict that.
MR. ELIJAH ROCK, SR.: I was told when I asked that question from the industrial people, they said 50 years from now. That was 70 -- when was it? 2007? About 20 years ago. I told them I'll be 150 years old by the time it will be available to buy all this from any service station or store. So that's a long way for me. I'll be dead by then.
MS. BETTY LAU: Once the gas and oil is produced, we have no direction as to how the oil companies --
DR. JIM KENDALL: One thing we have to remember, that we are the manager of the OCS land. We are not the oil companies. We don't work for the oil companies. And we can let them lease a piece of property under the law by the rules, but then they have to propose to us how they would develop it, how they would explore and what they would do with the product. So a lot of your great questions we can't answer until they come forth with how they would do it and what they would do.
MR. ELIJAH ROCK, SR.: You can also prolong -- like 30 -- you said you can't let any of the industry work on whatever they bought until they improve their methods of doing whatever they are doing --
DR. JIM KENDALL: Yes.

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MR. ELIJAH ROCK, SR.: -- to make it safe, not just for the environment, but for the environment and the ocean and animals.

DR. JIM KENDALL: Yes. We can do that within the law. When this issue came up that the Court said that there is a problem and they would like us to improve the document, well, our sister agency, who now controls basically the leases because the leases are let, they put a freeze on everything. The same way when that capping and containment device failed, they said you can't go into the oil. So yes, we have that kind of control.

And when the whalers and the scientists working together showed that you shouldn't have leases in 25 miles because that's where the bowhead whale migrates, that's where they feed, that's where they have their babies, we have the power to say no, the Secretary says no leases there. But it takes a while. And it may sound complicated, but it was done specifically so decisions weren't made too fast. Okay. If they make them too fast, maybe we might miss some information or we won't be able to go out to talk with everybody.

So yes, sir, it takes many years. But with many years of discussion and study, we can try to avoid problems.

MR. ELIJAH ROCK, SR.: So you have

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authority to -- the President decides and the government and the Senators decide they can do whatever they want to the industry? If they say yes, you have power to say no, right?

DR. JIM KENDALL: We have the power to say no under the law --

MR. ELIJAH ROCK, SR.: Okay.

DR. JIM KENDALL: -- as the law is written. And I think -- am I saying that correct, Lisa? Liz.

MS. LIZ GOBESKI: Yes.

DR. JIM KENDALL: I am not a lawyer, but we have to follow the law, and we do our best to make sure we follow the law, and we don't give any jump starts too soon.

MR. REX TUROYLUK: And your law is your Environmental Impact Statement.

DR. JIM KENDALL: Okay. The impact --

MR. REX TUZROYLUK: I want to ask you that.

DR. JIM KENDALL: Good question. The law requires us to do an Environmental Impact Statement that brings all the information together -- the science, the traditional knowledge, what people think -- and then we give that to the Secretary. And if we did our job right

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and you help us, then we can tell the Secretary, this document and all the stuff that goes with it is the things you need consider before you make a decision --

MR. REX TUZROYLUK: And the law is the amount of oil that we pull out from any source that we have in the Chukchi -- every lease sale we have. And I guess the other question is, where is this -- where does the animal and the people as far as the law versus the need for -- for our -- for fossil fuel to go on? Where is the line there that we can speak of? And that's the only reason I'm here, to make those lines to see where we could have some kind of impact.

DR. JIM KENDALL: That's a very good question. That's why we put this document together so we can write that out so that when the decisionmaker sees everything before them, they can see how much things might cost or what would be the impact to a community, what would be the impact to the marine mammals, to the fish, to the air and see -- that's what the law requires us to do, and that's what we are all doing now with your help.

That's why, as Earl said, this meeting is very important. We need to hear what you are saying so that we can put that into the document. And when we sit down with the people way above me, we can say we have the information here, the science, the traditional knowledge,

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the biology, the mammals. This is how -- everything we need to look at before a decision is made.

MR. REX TUZROYLUK: And how does the -- the amount of oil for our nation's need have versus the law? How much impact does that have?

DR. JIM KENDALL: That comes into the economic analysis where how much oil is there, how much does it cost to produce, is it worth doing. So that's discussed in the document, as well. But people above us have to consider that, as well. It's not us here.

MR. REX TUZROYLUK: My question is, how is the -- how is the needs for the country -- I mean, how do you balance that -- how do you balance it up for us with the need that our country needs?

DR. JIM KENDALL: That's a very good question.

MR. REX TUZROYLUK: That's my question.

DR. JIM KENDALL: That's what the decisionmaker has to weigh. That's why it's so difficult. I can't say how it's done. I can only say we lay out the information for the people --

MR. REX TUZROYLUK: Do we know our country's needs or demand for oil to keep what we -- as far as I guess fossil fuel. What's the --

MR. JACK SCHAEFER: Could I make some

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statements before you go into the public hearing phase?
DR. JIM KENDALL: Can we defer to the president?
MS. LILLIAN AANA LANE: Let the man finish.
MS. PEGGY FRANKSON: Let him finish first, Jack. He's not done talking yet.
MR. ELIJAH ROCK, SR.: Can I ask before you get done some more questions?
DR. JIM KENDALL: Sure. I mean, he is the president of the --
MR. REX TUZROYLUK: Who has those numbers for the demand, for the fossil fuel needs? Who has those numbers?
DR. JIM KENDALL: We don't have those at the tips of our hands, but those numbers are available.
MR. REX TUZROYLUK: Where do we find those numbers?
DR. JIM KENDALL: That would be the energy -- what's the name of that?
MS. SHARON WARREN: EIA. I can't think of the acronym. Energy Industry --
DR. JIM KENDALL: They are in the government agency that says how much energy the nation is using. EIA.

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MR. REX TUZROYLUK: How much weight does that have versus your Environmental Impact Statement or the law?
DR. JIM KENDALL: That's where the balancing comes in, my friend. This is where the art comes. That's a very hard question to answer. Everything you say is very true, but that's why we try to get all the information we can, the traditional knowledge, the science. We look at the price of oil, and that's presented to the people way above us, my friend. But those factor into this. And that's why we are here.
MR. ELIJAH ROCK, SR.: All of what you mention, are these categorized in numbers? Or like traditional knowledge, is that above where others are on the list?
DR. JIM KENDALL: That's interesting you said that because what we have learned -- when I was in Washington I didn't know what traditional knowledge was until I came up here. In fact, I've met a lot of people in the villages who have taught me about traditional knowledge. And one thing I learned is that traditional knowledge is not the same as Western science. It's parallel. It's a knowledge system that's just as important. And so it's right up there. Traditional knowledge is important as Western science. We try not to

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merge them because you can't because they are two different knowledge systems.
And when a whaling captain says, that's where I go to get my whales, we don't need to pay a lot of scientists to go out there and do that. I believe the whaling captains. But if we need to know what the currents are, we can put some buoys out there and measure currents. So now we have got where the whaling captains go for whaling to feed the village. We know what the currents are and, oh, my goodness, we get a better picture of what is there.
MR. ELIJAH ROCK, SR.: Science is based on research, and traditional knowledge is [inaudible].
DR. JIM KENDALL: He was saying that science is based on research, and traditional knowledge is based on observed fact. Did I say that right?
MR. ELIJAH ROCK, SR.: Yes.
DR. JIM KENDALL: And we agree with you. That's why I have come to learn and all my scientists and my friends, that traditional knowledge and Western science need to be considered together. And we sit down with the decisionmakers and tell them, this is what we have learned from the whaling captains, this is what we learn from science, and they don't conflict. They help us understand the big picture. It's really wonderful, absolutely

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wonderful.
MR. JACK SCHAEFER: I have some questions.
DR. JIM KENDALL: Okay. Jack. You have the floor.
MR. JACK SCHAEFER: Okay. The steering committee that was formed by agreement with the North Slope Borough and the oil companies in regards to currents and cycle of currents and study of currents, what they were displaying to us last month to our -- were incomplete pictures and saying we weren't able to completely see where the currents were. At one time we were not too [indiscernible] because they were going towards Barrow, but then we noticed that there was a slight turn, and it came around Cape Lisburne and then the cycle quit. And we have indicated that there was a need for more of those current studies. And for some reason they decided that they were going to continue and focus more on Barrow area in regards to current studies, which seemed kind of outside of the scope.
And so that's one of the deficiencies that I see. And I feel that -- is that something that would cause you concern in regards to NEPA requirements and dealing with having adequate information about currents?
Along with that, the ice gorging, there has been a lot of photography that was done by the National Science

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Foundation publications through Arctic research back in the 1980s. We had requested to have overlays of ice gorging photography to be done for the purpose of reassurances and the NEPA requirements and the information that we needed to see. And they refused to provide us with the most recent ice gorging in an overlay so that we could see how the ice was moving. I think that -- is that ice a NEPA thing that is missing in regards to informing us completely?

Responsible development, we have not been really clearly explained what responsible development is. All they say is that we are going to do it in a responsible way without explaining that. And that may be something that is misleading because we have not been told how it's going to be done in a responsible way.

Mitigation. We as a community and as the councils and as the community has not been really informed as to how mitigation was going to take place. Two years ago mitigation was along the lines that there would be money put aside in a good neighbor policy, and [indiscernible] to get whales, but the numbers were not there. They did not indicate which villages were willing to do it. And Savoonga was one of them that was mentioned and that the money didn't really cover it if we look at a reality picture because we were only looking at infancy.

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So I feel that's a NEPA thing that needs to be clarified.

Whale migration and traditional knowledge. Whale migration, only 25 miles off the shore based on input that was provided by whaling captains who was in association or the Alaska Eskimo Whaling Commission [indiscernible] traditional knowledge and science had indicated that the Herald Shoal and the Hannah Shoal were major feeding areas of the whale.

So there are some conflicts in regards to finding this and providing this information to us under NEPA, don't you think? When there are conflicts of information like that, doesn't NEPA require us to be clear?

MR. MIKE ROUTHIER: Well, Jack -- and this is Mike speaking -- anytime we do a NEPA document, we have an obligation to use the best science that we can and to use traditional knowledge, as well. And that's what we are doing here. We do have a lot of information about ocean circulation and currents, for instance. Are we learning more? Sure. We are learning more all the time. In fact, we are always conducting new studies to learn more information. That said, a big focal point in the prior part of this litigation was missing information or incomplete information.

And the agency -- I'm sorry -- the Secretary of

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the Interior did decide that even though we don't know everything, we know a lot. We have been studying this area for decades now. We have a lot of information, and it's enough to go forward with the first step in this process, which would be a lease sale. Is there more information that we could get? Yes. And we are going to try to get that additional information. But we feel like we have sufficient information now to write the NEPA document.

DR. JIM KENDALL: And as you know -- this is Jim Kendall, Jack. As you know, if the exploration would go forward and if they were to find something, then they would also have to take -- turn in probably a couple to a few years from now a development and production plan that would have all those specific details on how they were developed, and then we would have to do another Environmental Impact Statement since it would be really specific on what they were going to do.

As you know, Jack, the OCS Lands Act has four phases in it: The five-year; the lease sale, which is where we are at now; exploration; and then development. And the Congress set it up in four phases so decisions were not made too quickly and that there was plenty of time to study what they planned to do and we could do more analysis and go out to the public, do more science and get

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more traditional knowledge. But all good comments, Jack. Thank you. We have got those to take back with us.

MR. ELIJAH ROCK, SR.: I had one more question to you on the right there. You. Yeah. As far as the news that I have been listening to, we have a lot of open water now, not much ice. And all this traffic is coming through the North Slope over to Canada and further on. And that bothers me when you have that much traffic in the ocean because of our resource that they are disturbing out there.

DR. JIM KENDALL: Yes. That's a very good comment.

MR. ELIJAH ROCK, SR.: And also the trash that they leave out there.

DR. JIM KENDALL: Yes. That is a concern not only by us, but by the Coast Guard and BSEE and also the other Arctic nations, as well as the permanent participants, the tribal members all around the Arctic. There is a lot of ships up there. And I believe you take into account in the NEPA document about how many ships would be there and how many helicopters, that kind of stuff. That's in the document, you know, what we think would be involved in the 77 years. And we are also watching what others are doing, as well.

So that's a good comment. We understand what

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you are saying. And it's very important. We have discussed it in the document.

The gentleman in the back was next.

MR. REX TUZROYLUK: I'm glad you are respecting traditional knowledge, but the fact is as far as what we used to do and where we used to go hunting, years from now it's not going to be here, and you know why.

DR. JIM KENDALL: Yes.

MR. REX TUZROYLUK: Are you -- are you changing your law because -- there needs to -- your process is going to take a little while to get 100 million gallons out to the market. It's going to take a little while. But the time of the weather and where things are and as things come closer to those spots over there and it's getting warmer, and this traditional knowledge is no longer real because it's not with us no more. My question is: Will you make your laws to abide with the safety of the drilling and the animals for whatever you need and our people?

DR. JIM KENDALL: Okay. We don't make -- we don't make --

MR. REX TUZROYLUK: Are you going to put -- how serious are you about climate change? Whatever you want to call it.

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DR. JIM KENDALL: Yes, that is very serious. That is taken into account in the document. We understand what you are saying, that things are changing. For example, in one of the wells that were drilled in the Arctic, the company said it would take 38 days to drill a relief well. And so looking at the way the ice was changing, we knew that ice would probably form about November 1st in -- off of Barrow in the Beaufort, so we had to say, okay, if it takes 38 days, you are going to subtract 38 days from November 1st and you are going to be out.

So we watch the climate change. We work with the other agencies. We know things are changing. And we are doing the best we can to work that into our analysis. You are 100 percent correct.

MR. REX TUZROYLUK: And I don't agree with you with the temperature. Wherever the weather changes, that's where we change the law, if we mean what we mean.

DR. JIM KENDALL: Things are changing. You are correct. And we are doing our best to work that in. But that's a good observation. We still have some more presentation to go that Mike really needs to get through. So Mike and Betty.

MR. STEVE OOMITTUK: I have one question on your assuming development. I was kind of curious.

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What is your definition of an anchor field? You know, you assume development in there. You are talking about something that you are going to build -- they are going to build permanently or --

DR. JIM KENDALL: That's a good question. The anchor field, as I understand it -- I'm not an engineer, smart like Betty. The way I understand this is that if an oil company goes out there and they drill wells, they have to, quote, unquote, see a potential to make enough money to make it worth their effort. If they drill a couple exploration wells and the information says that they could make some type of profit, it's their decision that they want to proceed, that would become an anchor field, that, oh, my goodness, if I put some more drilling wells here and some production, I could at least break even. That's the anchor field.

Once they have the anchor field, then -- then things that are a little bit further away are called satellite fields that now they become worthwhile. But unless you have an anchor field where they can at least break even or make some money, nothing can happen. And as Mike was saying, that in the original EIS, with the price of oil and how difficult it was to work up there, even a billion barrels was a stretch.

But working with the courts, we had to look at,

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well, let's assume there is a successful exploration. Let's assume there is an anchor field. Well, if we make these assumptions, we get to a point that 2.9 billion barrels would make an acceptable anchor field, then they might go a little further. Okay? It's not a definitive number. It's just something that they have to get to first base before they can go to second base. And if they can't get to first base, the game is over.

MR. STEVE OOMITTUK: So are you saying this anchor field would be permanently there year-round?

DR. JIM KENDALL: Okay. If it goes to production, it would be. And we are going to turn that over to Betty and Mike because that continues in the presentation.

MS. BETTY LAU: Okay. Yes. If you want to think of it in other terms, the anchor field is the big one. The satellites are the small ones. The satellites, if that's all they found, they wouldn't develop it. It's not big enough. But if they find the big one, then they might add the small ones to it. So because we are -- we are talking about first producing oil, then gas, this goes on for a long time. You drain out the oil and then you start producing the gas for sale.

So it comes out to 77 years. By the time you do your exploration and you find a success, so then you go to

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development. You put in the infrastructure. You put in the pipelines to sell your product. You go to production. You produce everything that you can. And then another important last step is decommissioning, getting things cleaned up, getting those wells permanently plugged and abandoned with cement, which we assume they would do as those wells stop being productive.

DR. JIM KENDALL: Betty, for those four points up there, basically for exploration, everything is an if.

MS. BETTY LAU: Yes.

DR. JIM KENDALL: If there is successful exploration -- if -- and there is potential for an anchor field, then they might decide to develop. But the exploration has to be successful first. There is a big if there. And if they decide to develop, then they decide, well, we hope we get the production. So there is a lot of ifs there and a lot of assumptions. But for this document we have to have something big enough so that we could look at impacts that would be meaningful to people.

MR. TARIEK OVIOK: I have a question. My name is Tariek Oviok, for the record. I just -- I wasn't here -- I know you guys are probably aware of Project Chariot, and I'm not going to go into all the details of that, but I feel like I'm kind of reliving that because

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what I mean specifically is that you -- within the confines of this document that you are coming up with, you are saying that this is, quote, unquote, just an informational meeting that you are gathering from us because we are important within the confines of this document.

But yet my question is: Who within the federal government system for BOEM, who determines -- and this is a question in terms of litigation process. Who determines the time frames as far as meetings? You know, if that makes any sense. You guys are coming here. This is a lot of good information. We have good concerns, and we have a right to be heard, but yet -- I know this is not Anchorage, but we are a very important component in this process. And you guys, with all due respects, you come here and we have a limited time frame of -- I mean, everybody is understandably getting frustrated. It's almost time to go.

Who makes the decisions as far as whether this can be a three-day meeting, whether it can be a two-hour meeting and we have to wrap everything up real quick and then decisions will be made, to me, in a rapid time period? To me that's alarming. It's almost like Project Chariot all over again.

We are coming here. Hey, we've got a few people

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here. We are going to take a little bit of information and move these guys out of here and bomb the place. And this is the same scenario. We are going to hear a little bit. You are saying -- with all due respect, you are saying you are hearing us, but I don't think that's even remotely possible to give us a couple-hour time period on all this information that is important that will proceed to the point of you compiling these documents to therefore then make a decision.

Once again, I do not agree that this is just, quote, unquote, informational. I believe that this is exactly as you said. It's -- you guys are basically the police of this situation to allow development or to not allow development. So that's my question in regards to litigation, for future reference.

DR. JIM KENDALL: Okay. Bottom line is the decision to have things wrapped up by March was between the Department of Interior and the courts. And so we are on a schedule that we have to maintain to the best of our ability. There are certain time frames such as this for public comment. I hear you, sir. It is what it is. And we are doing everything we can squeeze into this time frame to meet our marching orders.

MR. TARIEK OVIOK: I just wanted to get that in for the record. And the other question I have is

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that in the third page you had the AIS development or whatever. And it said that the North Slope -- you had, like, seven different entities. One of them was the North Slope Borough for the gathering of this information. Who -- was there any kind of -- is there -- in this website that you are talking about, is there a way that I can find out -- like I want to know who spoke for me from Point Hope. So since the North Slope Borough was in there, who -- was there a voting process done with the North Slope Borough and did it involve Point Hope?

DR. JIM KENDALL: The way it works, sir, is that the North Slope Borough is a cooperating agency. So they helped write the document, and their logo goes on it. So I'm going to turn to my colleague Fran. For the North Slope Borough, do you happen to know who is calling into the meetings and helping?

MS. FRANCES MANN: I cannot --

MR. MIKE ROUTHIER: It was mostly the wildlife department because they were the ones with a lot of the good information about the environment. So they helped us understand what might happen to the environment if --

MR. TARIEK OVIOK: And I can find that on the website, all this informational documents that you guys are talking about? Because one of the things you are

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stressing is that you guys are compiling everything. And that sounds good, but I'm trying to find the differential process between what sounds good and what's factual.

DR. JIM KENDALL: Right. In this case, since the North Slope Borough is representing you, call the mayor's office and find out who is assigned to help on it. I am not involved in the day-to-day activity. That's Fran and our team. But the North Slope Borough, they are helping to write this. And they get all the documents as we write it up.

MS. MAE HANK: Can I say something?

DR. JIM KENDALL: Yes, ma'am.

MS. MAE HANK: Once they do the informational meeting, right after they are done with this informational meeting they go into public comments, and that's where our opinions are put into record. So right after they are done with their informational meeting, they go right to public hearing, and that's where we talk.

DR. JIM KENDALL: And there is more that you can contribute later on since it's not over yet. Good point. So Mike, continue. He will tell you how you can add more.

MR. TARIEK OVIOK: Thank you.

MR. MIKE ROUTHIER: We have covered a lot of the information that's going to be on these next few

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slides, so I'm going to go through them relatively quickly. But the main points are that the document considers new information. This is a new document. It has the latest information where we look at what about these oil and gas activities might impact the environment, and then we track those impacts through time. What about the impacts in the first few years? What about later on in development and production would cause impacts?

The analysis assumes two large oil spills, 5,100 barrels and 1,700 barrels. And we also do a hypothetical very large oil spill analysis, very low probability but very high impact. We thought it was important that the decisionmaker, the Secretary of Interior, would understand what would happen if something -- if a big oil spill were to occur, what would happen. We wanted to make sure she understood that.

MS. LILLIAN AANA LANE: With that said, how can you assure us that catastrophe will not happen, being the managers with them, for them?

MR. MIKE ROUTHIER: I don't think anyone can assure that. What we can assure is that we will do our best to review every plan that we receive and hold the companies to account and do our best to try to prevent that. I don't think there is any guarantees, though.

MS. LILLIAN AANA LANE: Well, you have

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probably learned a lot from the Gulf spill. I'm sure everybody was educated from that. So what kind of lesson have you learned from that catastrophe?

MR. MIKE ROUTHIER: That's a good question. So the agency learned a lot from that catastrophe. One of the things they learned was that we need some new rules. So they conducted new rule making and they made new rules that the companies are going to have to follow. So it did change our thinking of how we need to regulate these activities to make sure that they are safe.

Another way in which that changed our thinking is that before our documents didn't analyze the very large oil spill for Lease Sale 193. But after Deepwater Horizon happened, we said, okay, well, we know that this is possible. It's very unlikely, but it is possible, so we need to at least analyze it so that the Secretary of the Interior, the decisionmaker here, understands how bad it could be if that were to happen before she makes her decision.

MS. LILLIAN AANA LANE: So you make sure that they have an emergency plan for all that?

MR. MIKE ROUTHIER: We make sure they have that as part of their exploration plan. And there is other federal agencies that also look at that to make sure

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it's sufficient.

DR. JIM KENDALL: And that's an excellent question because that capping and containment system that Shell had in 2012 that failed, that's why they were not allowed to go into the oil-bearing zone. It was a requirement. They couldn't meet that requirement, so they were prevented from getting into what we call pay dirt.

MR. JIM NASH: Based on your Arctic standard that you have now, where in the Arctic have you tested and proven that it worked?

MR. MIKE ROUTHIER: What specifically?

MR. JIM NASH: He said earlier that there is a new Arctic standard for drilling. Where in your Arctic standard that you have came up with -- not you personally, but --

DR. JIM KENDALL: Jim, the standards are going to be released sometime this year. You will actually get to see it. That capping and containment system that failed was down in Seattle, but it would have to be up here, and it would have to be, I believe, certified by BSEE and the Coast Guard as Arctic ready.

MR. JIM NASH: Based on the standard that you put forth, where have you tested it and proven that your standards actually is acceptable?

DR. JIM KENDALL: That would be that other

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agency, BSEE. The document is not out yet. It will be out sometime this year. And it is going to look very familiar to what we made Shell do in terms of a relief well capability, capping and containment, getting better control of their contractor so they don't lose a vessel under tow. Simple things that make common sense. You will see it soon.

MR. STEVE OOMITTUK: I have a question on that. You guys being the managers, will you guys also manage the Gulf of Mexico leases and anything like that? --

DR. JIM KENDALL: Our sister office was managing the lease sales down there.

MR. STEVE OOMITTUK: And so, you know, just seeing that scenario, the 5,100 barrels, how many actual barrels came out of the Gulf of Alaska [sic] that came out of that well? What kind of --

DR. JIM KENDALL: A lot, but it was a deeper well with higher pressures, and the rocks and the formations are quite different. So what they put together for their very large oil spill plus those two other oil spills are based upon the geology of what we know for the state of Alaska. You know, every area is different. And we don't use one size fits all. So when the geologists and the engineers look at the Arctic, the Chukchi, for

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example, they have to say, okay, this is not the Gulf of Mexico, this is not California, this is not New Jersey. I mean, this is Alaska. We have to look at what's here and make sure it's done by the book for Alaska. That's why these standards are going to be Arctic standards, not Gulf of Mexico standards.

MR. STEVE OOMITTUK: But we are just curious of what exactly came out of that spill.

DR. JIM KENDALL: I don't have the numbers on the tip of my fingers. I know they are very high. I used to know them, but I forgot. Sorry. The numbers are out there. It's on the website. You can find it.

MR. MIKE ROUTHIER: Another thing our document looks at is cumulative impacts. And those are not just the impacts from our action, the oil and gas activities that we might permit over time, but also everything else that is going on. So that's going to talk about the increased vessel traffic that's happening; if there is more tourism, more community development, any military activities or research projects. That's the context in which we look at impacts. We consider all those things when we talk about what impacts might occur.

MR. JACK SCHAEFER: Question. Question. There is a newspaper article in the Anchorage Daily Newspaper where Shell had asked for more leniency

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[indiscernible].

MR. MIKE ROUTHIER: Can you repeat that, Jack?

MS. PEGGY FRANKSON: Jack, they didn't hear what you said.

(Phone connection was lost.)

MR. JIM NASH: If you were to reach the decommissioning stage, what is the model rate of money that will be set aside for the decommissioning period? Is there going to be money set aside from day one for when a well goes out of commission to have that well taken out? Is there a set rate that they would set aside? Do you manage that?

MS. BETTY LAU: There is a bond. Okay.

MR. REX TUZROYLUK: Can I ask a follow-up question?

(Phone connection was re-established.)

MS. PEGGY FRANKSON: The court reporter was saying she couldn't hear you, so you want to repeat what you said before you got cut off?

MR. JACK SCHAEFER: I was wondering, there was a newspaper article in Anchorage Daily News about a month or two ago where the Court should have more leniency in the regulatory end of [indiscernible] the offshore. And I was wondering what the status of that was and what

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happened.

MR. MIKE ROUTHIER: I believe what Jack is asking is about an article in which Shell asked for more leniency in those Arctic standards rule making.

MS. PEGGY FRANKSON: Jack, you've got to put it on -- there is too much static. You want to put it on mute for a little bit until they answer your question? It's a lot of static.

DR. JIM KENDALL: The question was -- the question, Jack, was --

MS. PEGGY FRANKSON: We told him to put it on mute because she couldn't hear. He was asking what's about the leniency, the Anchorage Daily News.

DR. JIM KENDALL: Oh, they want longer leases. Okay. What's going on with that is they are making that request to the Bureau of Safety and Environmental Enforcement. Once the leases have been let, okay, then BSEE is responsible for activities that occur actually during drilling and production and development. They have the option under certain circumstances to grant an extension of the leases. That's between BSEE and the oil companies and, of course, the courts and the judges and the attorneys and that kind of thing. We don't deal directly with that.

MR. JACK SCHAEFER: I'm talking about the

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request for more leniency on the regulations, not the extension of the leases.

DR. JIM KENDALL: Okay. Well, I can only tell you what my -- what my previous boss, Tommy Beaudreau, said, and he is now the Chief of Staff for the Secretary of the Interior. As -- he led the effort to prepare the Arctic standards which, as you know, Jack, are with OMB, the Office of Management and Budget, for review and some tweaking. When those come out, it's going to not be a surprise to anybody.

He said if you look at the standards that we held Shell accountable for, that they couldn't get into the oil-bearing zone because they didn't have a capping and containment system. They had to have relief well capabilities, et cetera. If you look at what we held them to and you look at that 60-day report where we worked with other agencies and reviewed that entire process and found other flaws and made other recommendations, if you look at that report and you look at what we required of them, there is not going to be any surprises. And yes, there are probably companies that would not like us to be that strict, but based on what we are hearing from our bosses in the Administration, it's going to be a very good set of standards that not a lot of people are going to be happy with.

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We have to protect the environment, protect the communities while there is an option to get the oil and gas resources if it's appropriate.

And Mike is going to continue with the presentation. It's wrapping up.

MR. MIKE ROUTHIER: Right. So this is about the process we are in here. Right now we are in a 45-day public comment period. There is probably a little more than a month left in that period. Eventually we will get all the comments, and we will respond to comments. We will revise the document, respond to comments and make a final version of the document. And we are expecting to release that final version in late February of 2015. After that there is a brief -- 30 days after that, the Secretary of the Interior makes a decision in this case and gives her decision, and that can come as soon as March of 2015.

Now, as far as how to give your comments, if you give them here tonight, we have the court reporter. There will be a transcript of this public hearing that we could all look at. And we are going to consider all the comments we receive when we do the final version of the document. Or if you have additional comments, you can go to this website. It's regulations.gov. And there is a link here. We also have handouts in the back that will

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walk you through how to get onto that website and provide your comments. And that comment period closes December 22nd at 8:00 p.m. Alaska time.

And that concludes the presentation.

DR. JIM KENDALL: And I would like to add one thing. I checked with our pilot. We do not have to leave at 10:00. So if we have to stay here past 9:30 to make sure we get comments tonight, that's fine. And anything we can't finish here, you can go to that website and send us everything and anything you want. We can't make a good document unless you help us.

MR. ROY FILE: One quick comment. I heard Mike mention on this Lease Sale 193, I heard him say Statoil, ConocoPhillips and Shell. I've only heard you say Shell.

DR. JIM KENDALL: Correct.

MR. ROY FILE: So is Shell the only one out there?

DR. JIM KENDALL: Right now Shell is the one only one that has an exploration plan to us. Now, remember, they gave us an exploration plan that was approved under certain conditions. And they drilled those two top wells, one in the Beaufort and one in the Chukchi. Then the Court said, stop, you need to fix this deficiency, and you can't approve any exploration plans

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until you finish this. In the meantime, Shell gave us another exploration plan for 2015 that we can't officially do anything with until we fulfill our responsibility to the Court. There are other companies out there like Statoil and ConocoPhillips that have leases, but they haven't given us an exploration plan. They are kind of watching what Shell is doing.

MR. ROY FILE: Yeah, because I have only heard you mention Shell, and he mentioned other companies, so --

DR. JIM KENDALL: Yes.

MR. ROY FILE: That's all I hear from you is Shell. And there is other companies that own some of these leases out there?

DR. JIM KENDALL: Correct.

MR. ROY FILE: Okay.

MR. REX TUZROYLUK: What kind of plans do you have in case we have an oil spill, and how are you going to clean up the ice?

DR. JIM KENDALL: Good question. When we look at that exploration plan, if we finish this -- if we finish this and the Secretary allows us to move forward and if we approve an exploration plan, a complete oil spill response plan gets submitted to the Bureau of Safety and Environmental Enforcement for everybody to see. Okay.

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That will go up on the website. But it's their choice when. It also gets reviewed by a lot of other agencies: The State of Alaska, NOAA, the Coast Guard, other folks. So that's where that comes into play.

MR. REX TUZROYLUK: Why don't we have this information? If you want this -- if you want our support to move ahead to do what we have to do and you can't give us answers for you to support what you are doing, you and I are both in trouble.

DR. JIM KENDALL: You are correct, but the oil spill response plan falls under another agency at a different time in the process. And they cannot move forward. Even if we approve an exploration plan, a company cannot move forward until their oil spill response plan is approved by another agency. And it was set up that way so there is checks and balances so you don't have like the fox in with the hen house.

You know, we are doing our thing, and then we get this done, and if it goes forward, then another agency says, okay, now it's my turn to see if you are doing this part of it right.

MR. REX TUZROYLUK: I'm grateful for that, but in my heart I don't think it's right because you are asking for my blessing.

DR. JIM KENDALL: We need your help to do

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a document.

MR. REX TUZROYLUK: My help. Whatever you want to call it. But I'm uncomfortable with that if I can't see what your plan is.

DR. JIM KENDALL: Okay. It's not our plan. It's what a plan --

MR. REX TUZROYLUK: Whatever is out there, it's impacting us.

DR. JIM KENDALL: Correct. You will see an exploration plan -- correction. The exploration plan is already up on the Web. But an oil spill response plan is by another agency, and they have a process that would take everything you are saying into account.

MR. REX TUZROYLUK: And they won't come here and present it to us.

DR. JIM KENDALL: I can't speak for them.

MR. REX TUZROYLUK: Who speaks for who and what are we doing here if we can't --

DR. JIM KENDALL: We are only the land manager. I understand your frustration, but we are the land manager. The oil spill stuff falls under the policeman, and the policeman is our sister agency BSEE. We are only the landlord. BSEE is the cop.

MR. REX TUZROYLUK: When is the best time

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to knock on their door? Because I have something to say.

DR. JIM KENDALL: You can send them a letter whenever you want.

MR. LLOYD VINCENT: Lloyd Vincent, for the record. After all this is said and done, would the Secretary of Interior have signed the documents for us to see?

DR. JIM KENDALL: Is the Record of Decision public information?

MS. LIZ GOBESKI: Yes.

MR. LLOYD VINCENT: It would have to be signed by the Secretary of Interior?

MS. LIZ GOBESKI: Yes.

MR. LLOYD VINCENT: That's all I want to know.

DR. JIM KENDALL: That's a good question.

MR. JIM NASH: What's the amount of the bond for the decommission?

MS. BETTY LAU: That amount of bond is set on the basis of whatever the number of wells, the platforms they decide to put in. All of those things are -- form the basis of the actual bonding amount that a company is required.

DR. JIM KENDALL: We don't have the numbers at the tip of our fingers, but it's a very serious

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matter. And I know we're always going and looking and making sure there is enough bond if there is a problem. That's a good question.

MS. BETTY LAU: For example, when they put something else in, they have to increase their bond amount.

MS. PEGGY FRANKSON: Page 154 of your Environmental Impact Statement, it states that based on the mean spill number, a Poisson distribution indicates there is a 75 percent chance of one or more large spills occurring over the 77 years of the scenario and a 25 percent chance of no spills occurring." And that's up from the original EIS by -- from 40 percent. Why is --

MR. MIKE ROUTHIER: It's due largely to the fact that the new scenario is much bigger and it assumes a lot more oil. And the more oil that's produced, the more likely a spill becomes. So in a sense we are analyzing 4.3 billion instead of one. The chance of a large oil spill went up.

MS. PEGGY FRANKSON: Okay.

MR. SAYERS TUZROYLUK: I'm Sayers Tuzroyluk. I'm speaking on behalf of the Tikigaq Corporation. We have expressed ourselves as supporters of responsible drilling, and I see not where it's very well defined. But we are very concerned about the future, and

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at this time oil development is a big part of our future. And we at this time have to decide or express ourselves as to what we really need. And from my side we have shareholders, and this is very important to us. And I have to say I stand behind that.

DR. JIM KENDALL: We want to take a quick break here? We can make some more coffee. So how about a ten-minute break so people can stretch their legs, get some more cookies if there is any cookies left.

(A break was taken.)

DR. JIM KENDALL: We are going to get started now. This is where we technically have the phase where we are, quote, unquote, taking testimony. So you are welcome to come up. Of course, Elders first. And we can stay here as long as we need to. Tell us what you think. Send us -- the e-mail address up there or the website, as Mike referred to. And with that, please give your name. That would be a great help. And speak to Mary so she can hear you. And let's begin. Who wants to go first?

MR. TARIEK OVIOK: I'll go, unless any Elders have anything first.

MR. JACK SCHAEFER: Can I go first?

DR. JIM KENDALL: We have a gentleman who is speaking first there, Jack.

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MR. JACK SCHAEFER: Okay. You got someone else? I'll wait.

DR. JIM KENDALL: Okay. After he speaks, I'll have you speak. So if you want to come a little closer, if you don't mind, it would help so Jack can hear you.

MR. TARIEK OVIOK: I'm wondering, with this study that you guys have submitted, one important aspect that I haven't -- maybe I just haven't read it yet. Is there -- within these documents that you guys compile, do you guys have a -- somewhat of a backup plan that consists of the Inupiat people and the alternatives that you have in cases of catastrophes? What are you guys -- how do we fit into your plan as far as having resources to help us during those catastrophes rather than just leave us hanging? Because we -- as you know, we live off of the ocean and the land, and when technology, for whatever reasons, dies down, and considering the fact that we have been here since time immemorial, we obviously are still going to want to be here. This is where we are from. We live off of the land and the ocean. So in cases of catastrophes, I don't see no plan. What is the plan involved in that?

DR. JIM KENDALL: Okay. That's basically a two-part question. We consider the importance of

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subsistence in the document and what would happen if there was a catastrophe. The other part of your question deals with oil spill response. And that would be our sister agency and what they would require of -- on the ground should something happen. Okay? So what you said is very important, and we have got it in the record. That's what we needed.

MR. TARIEK OVIOK: Okay. Thank you.

DR. JIM KENDALL: Jack, your turn. Jack?

MR. JACK SCHAEFER: Hello. Can you hear me?

DR. JIM KENDALL: Yes, we can hear you, Jack. Your turn.

MR. JACK SCHAEFER: Okay. For the record, my name is Jack Schaefer. I'm President of the Native Village of Point Hope. And I'm also city mayor of Point Hope. I thank you for attending and for providing us with some information with reference to some of the plans for the Chukchi Sea area.

I'll go ahead and repeat what was said before. The tribal council is one of the governmental -- of the government. We have a responsibility to the well-being of our members, and as a government, we have governmental functions and responsibilities in regards to health, safety, economics, like any other government.

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And so we have been here for thousands of years, and we will continue to be here. This is our land, our ocean, our property. And we feel and we do believe that we have a [indiscernible] right here and a human right under the law. Our interests go beyond the 200-mile economic zone of the United States, which include [indiscernible], and we stated that before in the past in previous hearings. And we are seeking to recover our ocean as ours.

In the District Court of the United States [indiscernible], but it's what we are going to do and we are obligated and we have been trying to do this since the 1970s. And so our interests are beyond 200 miles. We have governmental functions. We have regulations that we have to put together just like any other government. And we will keep that ownership. And we cannot do irreparable harm or imminent threats. We try to adjust them as we can, and we are.

We have not been completely informed about responsible development. It has become a new pattern that is being used with explanation despite what we have said over and over again in regards to technology and how technology has evolved over the past several decades, which was not very much evolution in regards to technology.

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And so the Environmental Impact Statement is a good step in the right direction. There is still a lot of missing information. The United States shouldn't say that they cannot gather this information because it costs too much. There should not be any excuse with regards to the United States' responsibility toward us as indigenous peoples under the Compact [indiscernible] Association of the United Nations that was done in 1938 [sic] in dealing with their responsibility toward us and in the world. And they are still bound by [indiscernible] several years ago [indiscernible].

The policy is that we are a minority and we are to be included in there and are supposed to be in control of what goes on in our destiny. And we do not support unresponsible development. We have to make sure that things are done in a correct way. And we have not been shown that. And we don't really know who to believe and who to trust.

In regards to information that is being provided to us, whether it be by our coworkers, whether it be by ASRC, we have to have a very, very clear understanding and proof, and that has not been given to us. The pressure has been put upon us privately, publicly. We have been [indiscernible] in regards to what is fair. We have been represented by organizations that have not been

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transparent, that have not been forthcoming, and have not provided us with sure [indiscernible] or truth. And we should know that, and it should be on record that we don't know what mitigations are in place and what are adequate. I personally feel they are not adequate, as I described earlier in our questions dealing with the facts.

And so mitigation, feasibility, all of those things play a role in regards to whether something is going to happen. And we don't have much [indiscernible] clear and [indiscernible] refuse to cooperate with us in regards to that because they are responsible for their own feasibility studies [indiscernible] and how they are going to do things, that we go into this on a step-by-step basis, which is somewhat difficult and unfair in regards to what we have been saying.

And so we own the ocean. It is ours. It was provided to us and God has given it to us and God is the one that has provided it with all its food in our life and our culture, and we can't go against that because that is us. And we celebrate that with Thanksgiving, Christmas, whaling festival.

There is talk about we are not going to be able to survive without oil and gas, but there are also plans that have been put into place that take into consideration that the price of oil and gas is so high and it's

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encroaching that we at its grassroots and those that are not embodied -- we know the vast majority cannot afford to buy gas to go out hunting.

So things have been talked about in our communities and in regional gatherings that have not really been shared or talked about, but they are aware that the price is high and that there are only a few people who can afford it. And that is a reality and we [indiscernible] unless we come up with something else. And our companies are responsible for generating jobs, and our companies are aware that there is other nonrenewable resources.

In regards to [indiscernible] that support development, the future [indiscernible] that have looked away from the Beaufort Sea area and turn away from the proximity of the Trans-Alaska Pipeline. And you guys are continuing oil and gas development in the Chukchi. So it looks kind of strange that that picture has been painted. It also looks very much like being reflected by Barrow.

And so when you look at all of those studies, technical papers, all those -- all those papers that have been generated since 1970, you will see where all that oil is and where that trend is going and where all this development is going to go. And they are trying to skip that whole area when you look at that. [indiscernible]

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but still it looks that way. Culturally [indiscernible] the Chukchi in the whole basin. That is something that has not been said.

And so, technology is not there. It's very difficult and impossible for us to support something that has not been proven. And we still have the [indiscernible] that we are pursuing. And [indiscernible] to our ocean that belongs to us and we are taking care of it and God is providing that to us. And we will always hold that position until proven otherwise. And that hasn't happened.

There has been a lot of pressure that's been accounted to us, a lot of people from industry without real clear explanation and proof that this can be done in a safe manner. Responsible development has to show its head that it's safe and prove that it is safe, not just stated it's responsible without showing us or proving to us. We haven't seen it. I don't know if anyone has seen it. And if you have, please let us know because we sure haven't seen it.

And so again, I thank you for allowing me to speak. And we thank God for what he has given us. And we thank God for that we have had good decisions, and one of the decisions was made to have a relook at this Environmental Impact Statement and we reflected and we

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thank God for it. And we will continue to maintain that [indiscernible] and look forward to continue that way in our life and performing as a responsible government and moving forward to fulfill the offices that we are obligated, to replace those people that are sitting there facilitating these meetings with our own people because that's our responsibility.

Thank you.

DR. JIM KENDALL: Thank you, Jack. Thank you very much. Sir, come on up.

MR. SAYERS TUZROYLUK: Good evening. Thank you for the opportunity to provide comments on the Draft Second Supplemental to Lease Sale 193 Environmental Impact Statement. My name is Sayers Tuzroyluk, and I am a director of Arctic Inupiat Offshore, LLC or AIO and also the Chairman of the Board of Tikigaq Corporation. TC is a for-profit corporation created under the Alaska Native Claims Act, ANCSA, with the purpose of providing economic benefits to our shareholders. TC has approximately 1,500 shareholders, most of whom reside in Point Hope. TC is a member also of AIO, which has made an investment in leases that were sold under Lease Sale 193, and therefore we have a strong interest in the Draft EIS.

One thing the federal government did not do when it sold leases in Lease Sale 193 was to deliver revenue

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sharing to the communities closest to the exploration through federal impact funds. The results were that the coastal communities of the Chukchi Sea would assume the risk of changes to our oceans and sustenance through drilling, but we would not receive any of the benefits. This situation created frustration and a long opposition to the OCS in our community. It is -- it created division within our culture in a place where we have to be good neighbors. We were frustrated that the federal government went forward despite our concerns. Really what we were provided was a public process that asked for our input after the fact.

The rifts in our community created an opportunity to outside interests to prevail and to try to speak for us, represent us and use us. There have been many lawsuits filed, and this Draft SEIS is a result of such legal action. However, we decided to take things in our own hands, and TC joined with five other village corporations and our regional corporation, which is ASRC, to form AIO. We felt we needed to do this because if OCS was going to happen, then we needed to find a way to get some of the benefits and not just all the risks. We did something we never contemplated before. We bought an interest in leases that Shell owns. Those are the leases that were shown.

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So despite the fact that we looked to the government to take into consideration our needs, we took it upon ourself to engage, and we now have a seat at the table and have the ability to help guide Shell in its operation to make them safe for our communities and also our environment. This is very important, and it's important for our shareholders and residents to understand. We have the ability to influence their program. And if they are successful, then we will also get the reward and be able to pass that onto our shareholders through dividends. We need to be actively engaged.

My comments on the Draft Second Supplemental for the Lease Sale 193 will be short. First, we have not been afforded the time to thoroughly review the draft document. We understand that the scope of the Draft SEIS is very narrow as defined by the Ninth Circuit Court of Appeals in its remand.

Thank you for -- thank you to the ` of Ocean and Energy Management for releasing the Draft SEIS in a timely manner. AIO will be providing more extensive written comments on the Draft SEIS prior to the end of the comment period which ends on December 22, 2014. We do ask, however, though, that BOEM maintain its schedule. Actually, we ask that BOEM maintain its schedule and not

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let it slip so that we can have a timely Record of Decision issued and hopefully close this matter about Lease Sale 193 once and for all.

Again, I thank you for your time and attention. Additionally, more information will be detailed and our comments will be forthcoming. Thank you.

DR. JIM KENDALL: Thank you, sir. Can we have your document for the notes?

MR. SAYERS TUZROYLUK: Yes, you may.

DR. JIM KENDALL: Excellent. Thank you very much.

The floor is open. Earl.

MR. EARL KINGIK: Earl Kingik, for the record. I'm going to take my hat off. I work for the Alaska Wilderness League. It's a nongovernmental organization, but I'll take my hat off and put my hat on as a Point Hoper. On actions to be taken I said no. Alternative 2 should be considered because our animals and our way of life depends on the ocean that they are going to have a lease sale on and EIS is in the process. I thank Native Village of Point Hope for appealing and giving another round to go through this very important document that's going to be going forward for our young people. I am happy to see our young kids to being here. They will be impacted by the activity of this EIS.

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I'd like to make my comments short because our president on Native village made very strong comments, and I'm 100 percent behind him. We are really against offshore activity because we are a part of the ecosystem. Without the animals we wouldn't be here.

When I look to my east, I see land. When I look to my south, I see ocean. When I look to my west, I see ocean. And again, I look to my north, I see ocean. The ocean is our way of life. The ocean is very important to the people of Point Hope. We have been living here for thousands of years. To let you know, we are the oldest inhabitant community in North America, and we should be part of that. Not only will oil development be impacting our area; we are having high heavy traffic that will be going on. Oceanliners. A lot of that is going on.

In the last few months you have heard about this barge that's up in the north, a Canadian barge -- they couldn't even rescue it -- with over 5,000 gallons of fuel in there. And if it happen in our Chukchi, it will happen the same way. We don't know if they are going to be able to clean it.

I had a chance to go to the Deep Horizon when I first got work for the Alaska Wilderness League. I witnessed how the government works. I witnessed how the oil industry works. They were stalled at least two

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months. When I go out in the ocean, I could smell it. Burn my eyes, my nose. The crude oil couldn't get out of my nose for a long time.

See, our Elders always have an Elders conference. And we always hear from my Elders, don't let them go to our ocean. Don't let them do any kind of activity in our ocean because this is our way of life. This is what keeps our people united. This is what keeps our activity going on as a strong cultural community.

So I strongly say I want Alternative 2. Thank you.

DR. JIM KENDALL: Thank you, Earl. Who would like to speak next?

MS. LILLIAN AANA LANE: Good evening. I speak for myself. My name is Lillian Aana Rock Lane. I speak for myself. The animals, the ocean, the land, the air are intertwined. They cannot go without each other. If any disaster happened, it will ruin our garden. That's our garden. It provides everything for us: The natchiq, the nanuq, the ugruk, the agviq, which we treasure, which we treasure. And this is -- this has been happening since time immemorial. And we want to keep it that way.

I understand the changes, the wants, the needs. The love of money is the root of evil. I really don't trust the equipment, the equipment that they will be using

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for these projects because nobody has assured us this is a safe way to do things. The oil companies, when they come, they haven't assured us these things will work for us. Until you get 100 percent assurance from someone, maybe we might allow it. But I know that money talks. Money is going to do it for them.

How could we win over this, but by the grace of God who has given all of this for us? We cannot buy the whales. We cannot buy the ugruk. We cannot even sell it right now. How they expect us to take care of ourselves should catastrophe happen in our ocean?

They are still investigating the oil spills at the Gulf. They still haven't figured out why, why it happened. Even up to today, they haven't had any answers. And I'm really uncomfortable with that.

I oppose the Lease Sale 193. This is from my heart. Some people might think differently, and I honor your -- your -- your opinion. But we have lived this way for so long, it's going to hurt us. Not only us. We have an opportunity to live this way. We pass it onto our children. What are we expecting for our grandchildren? Not to even be able to go out there and hunt? And that's what I see. I see the red sea. I oppose that. And I just pray to Our Heavenly Father that they won't find anything out there. Thank you.

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DR. JIM KENDALL: Thank you. Who would like to speak next? Yes, ma'am.

MS. MAE HANK: Mae Hank, for the record. I am an Inupiat Community of the Arctic Slope Tribal Council member. I'm a tribal -- I'm a Native Village of Point Hope tribal member, also a shareholder of Arctic Slope Regional Corporation and Tikigaq Corporation, and I oppose any activity on the Lease Sale 193. They have no proof of any way to contain any oil spill that happens. We saw already what the Gulf has done for the Pacific [sic].

Majority of our year our ocean is covered with ice. How do they propose to contain any oil spill under the ocean ice? How do they propose to do it? Once the ice breaks up, it spreads all over. The ice will act like a suction, like a sponge, and it will spread all that oil spill all over.

One thing that the federal government should be putting regulations on is importing oil and gas. Retain it just for the United States because in order to do that, we have to -- we have to make sure -- ensure that the First Nations are not being jeopardized for the sake of money. Sure, we enjoy the type of life we live now, but the thing is, there is alternative energies, and that's what President Obama is encouraging all the states to do

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is to look into alternative energy, renewable energy. And it hurts to see what's happening for the sake of money.

We prefer to have our Native food, our traditional food. Can the government guarantee us alternative food in the event of an oil spill? Can they provide us annually for 50 generations food every year? Because the majority of the communities are unemployed. They rely on traditional food. They rely on the whale, the beluga, the walrus, the bearded seals, the seals, fish, caribou, and whatever our land provides. Can the government guarantee us food annually for 50 generations if they are going to risk our livelihood, annihilating our culture, our religious practices? Will they guarantee us that?

That's -- that's in the part where food security comes in. You are willing to risk the First Nations' food? Every time you intend to drill out in the ocean, you are risking our food. We eat it. I just thawed out some muktuk tonight because I haven't had dinner, muktuk and fish. That's going to be my meal when I get home after this meeting. I eat it. I have to have it all the time. Our freezers have to be stored in order for us to have it.

And with the climate changes, everybody says, oh, it's going to happen. It's going to happen. Go

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ahead. Approve offshore development. Approve the maritime traffic. Approve seismic testing.

And then I found out that I heard there is another alternative besides seismic testing where they can look in a pod as to how deep it is where they wouldn't have to jeopardize our animals because every time they do seismic testing, they kill off the tomcods. We can't get tomcods every time for several winters.

I know I am a shareholder of Tikigaq Corporation and Arctic Slope Regional Corporation that supports offshore, the oil development activities that are proposed to happen on Lease Sale 193. But my shares say no to it. My -- my family and my grandchildren, over 1,000 shares say no to offshore development from Tikigaq Corporation and ASRC. I am a shareholder, but we did not voice our right to say yes or no. They made that decision in the rooms, in their conference rooms, and they did not go to us, the shareholders, to make that determination whether we wanted to go. And I oppose it. My shares oppose it. My shares in Tikigaq Corporation, my shares in Arctic Slope Regional Corporation oppose any development on 193.

I'd like to thank you guys for coming here and giving us the opportunity to speak. And I hope we are being heard and not set aside. Thank you for your time.

DR. JIM KENDALL: Thank you for your

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comments. Who else would like to speak for the record?

MR. JIM NASH: Jim Nash, for the record. What is the primary action plan for any NGLs pulled off of an oil rig here in the Arctic?

DR. JIM KENDALL: The NGLs?

MR. JIM NASH: Any natural gas liquid.

DR. JIM KENDALL: Betty?

MS. BETTY LAU: The first stage of development, those will be sent in the oil pipeline to Prudhoe for processing.

MR. JIM NASH: Because based on every question I've asked so far, does everyone know that we are talking on step 2, but they have already planned for step 99? We might be talking about step 2 right now, but thought has gone into step 99 already. And every question that I've asked so far has been to show that. And even though we are stuck talking about step 2 right now, I think it's unfair to us as a community, as a people, that you are already thinking of step 99, 100, 125 in this whole process.

DR. JIM KENDALL: Thank you for your comment, but we have to follow the law and go step by step. But it was set up that way so that when a leaseholder gets a lease, it only gives them the right to submit an exploration plan, et cetera. It doesn't give

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them any rights until they follow the law. But thank you for your comment. Sir, you were --

MR. STEVE OOMITTUK: Yeah. Steve Oomittuk. You know, I lived in the Arctic all my life. You know, we grew up here. We were raised in a different time, you know, before all this energy came, and now we are depending on it. You know, we lived without oil, we lived without gas, you know, electricity, in our time, snowmachines. You know, we know we can't go back to how it was, but we are concerned about the safety, you know, of the animals. You know, they are who we are. They are our identity as a people, our food source.

Yeah, there is oil, there is gas. We don't benefit from it. We are the highest paying people for a gallon of gas or diesel. We are lucky to be subsidized; otherwise we would be paying this enormous rate. Here it comes off our land and our ocean, and we pay the highest for gas, for diesel. You know, we are very low income. We are low population.

We rely on subsistence, a way of life that has been passed to us for thousands of years. Without the animals, we wouldn't be here. Our food, our shelter, our clothing, our identity as a people that has been passed from one generation to another. I want my kids to continue that, my grandkids, their kids. You know, the

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population of the Arctic is never going to grow. We are always going to rely on the land and the sea, the sky for -- you know, for our food. It is who we are as a people.

We want insurance that, you know, our way of life and the animals that make us who we are are protected. You guys are making this decision for us. We have no jurisdiction in this federal waters even though we have been here for thousands of years. We want insurance that, you know, these companies that are coming in and taking it out of our ocean, we want -- we want to ensure that, like I said, 100 percent, that there isn't going to be a spill.

You know, we see our climate changing. We see all these things happening in the Arctic: The ice, you know, the weather. The ice retreats back over 400 miles now. It used to only retreat 100, 80 miles. Even 80. You know, now it goes 400. We see the currents, you know. Look, we still have no ice out there. It's just forming.

But we want insurance. If BOEM is going to be responsible for this -- you know, you are talking about our livelihood, our way of life. You know, we -- yeah, we are never going to leave. We're always going to be here. You know, it's so expensive for us just to go to Kotzebue. We have no jobs here. We have no money. But yet we still

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pay the highest for a gallon of gas or diesel. It doesn't benefit us.

In the beginning when the borough was formed, yeah it did, but today, no. We want insurance that we are protected, the animals are protected because without the animals, you know, we are nothing.

But we thank you for coming. We thank you for listening and hearing our concerns. You know, we know we can't go back to the way it was, but we want to make sure we have a voice and that somebody is listening. Thank you.

DR. JIM KENDALL: Thank you, sir.

MS. PEGGY FRANKSON: Peggy Frankson. Thank you for coming and hearing our comments on the EIS. One thing that I'll be having our council review is on page 119. The wildlife for Point Hope area is not correct. So we will be sending you correct information on all the wildlife and land and sea mammals, birds that we have here in the area.

In addition, I also want to say thank you for making our traditional knowledge part of this Environmental Impact Statement. And Secretary of the Interior needs to realize that, like you said earlier, it's not this -- traditional knowledge and Western science, they are totally different, but they need to be

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looked at side by side, definitely. And she has to realize that our food that we get from our land and our ocean is what we survive on, is what we eat practically on a daily basis.

If she came here and looked at everybody's freezers, you are not going to see -- you'll see a few pizzas or burritos or whatever, but 90 percent of our freezers are full of the animals and the birds and the fish and the whales that we catch, the berries that we pick, you know. And nobody has more -- just one freezer. Everybody has two, three freezers. We have -- we have ice cellars down there where the whaling captains store the whales, part of the whales that they catch each year, underground ice cellars. Have you seen those yet? Have you heard about those yet? I mean, the whale's tail goes there until it's time to do our whale tail celebration, our ceremonies. The muktuk and the whale, the meat go there until Thanksgiving and Christmas, and then they share with the whole community.

I mean, those are an important part of our whole culture. I mean, the animals that we hunt and survive off of is what makes us who we are. And the Secretary of Interior needs to understand that and you need to make sure that is as important as Western science in your Environmental Impact Statement.

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Thank you.

DR. JIM KENDALL: Thank you very much. Who else would like to offer comment for us? The floor is open. All are encouraged. It's your meeting. What you tell us goes into the record. We take it back and study it and pass it on.

I think everybody is getting tired. And thank you for sending in the revised information. That is exactly what we need. I mean, that is absolutely perfect. Thank you. If we don't hear anything else --

MR. JIM NASH: What is the line of communication between this meeting and every other meeting that happens? Who is it going to, all the stuff that the stenographer is writing?

DR. JIM KENDALL: All that information comes in, it goes to our analysts, the people that work on Fran's team and others. We study it just like we would study a science paper, and we integrate that into the document, and we hope that the document -- and we strive to make the document something that not only we are proud of, that you are proud of it, too, because you can see your information in there.

MR. JIM NASH: And also what is the timeline from the first rough draft to the draft you have now? How many days expired between that point and now?

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DR. JIM KENDALL: Mike, do you have a handle on that?

MR. MIKE ROUTHIER: The -- we said earlier this was in response to a court decision, and that decision happened in January, and that's when we knew we would have to do something. So we have been working on this document for almost a year.

MR. JIM NASH: So if you are given that amount of time to create this document, why have we not been given that same amount of time to review it?

MR. MIKE ROUTHIER: Well, the review started -- come about August we had something in good enough shape to send out to the cooperating agencies, which included the borough. But it just wasn't polished enough to send out for public review until last month.

MR. JIM NASH: Okay. So you are saying you had about nine months, ten months to create the document. Why is it that we only get 45 days to help you review it by giving our input into it? Why aren't we given the nine months also to prepare our arguments as to why we should be against this?

MR. MIKE ROUTHIER: That's a good question. The timeline, though, is out of the hands of anyone here. It was dictated by the department, by the Court.

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MR. JIM NASH: Is there not a way to put a delay on? Does anyone have a motion for delay?

MR. MIKE ROUTHIER: You can certainly request one.

MR. JIM NASH: All right.

MR. TARIEK OVIOK: Since you guys are speaking on behalf of safety, along with what he's talking about, isn't that something that would be your responsibility, to put a delay on that concern? Is that a fair question? What he just mentioned there and what he responded, is it fair within the parameters of you guys coming here and looking at everything thoroughly for safety precautions and all the other dynamics, so within all that, you guys wouldn't entertain the thought of putting that very delay that he just mentioned?

DR. JIM KENDALL: It's not our decision. We will definitely take that information back and pass it up, but we have to do what has been agreed to between the Department of Interior and the Court. And we are doing what we have to do because that's the arrangement between the Court and Interior. You are welcome to say what you said, and we will pass that up. But right now we have got to keep to our schedule unless someone above us changes it.

Anybody else? Please look at the website.

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MR. ELIJAH ROCK, SR.: The way I understand what people are talking about right now is that we are actually under the government that runs the world. And what we say has no power at all because when you say it's not our department, okay, then it goes to a different department that we should be talking to, but they are not here. It's something that we have encountered for many years as far as the present world in Point Hope and our government always telling us -- you know, coming in and this has got 45 days, this has got a year. This is one step, two step, three.

These are things that always come to my mind that doesn't even help me or my -- my generation here or younger generation that will be here after me and a lot of us. And we are run by the government, and the government alone has the power. We don't have no power at all. That's the way I understand it.

DR. JIM KENDALL: Well, a good comment. We are looking at -- right now we are working under a plan called integrated Arctic management where we are trying to get all agencies involved in helping to make decisions to know what each other is doing. So when Mike and Betty went through the cooperating agencies and the participating agencies, that was a pretty long list of folks that are helping to do the document. That's

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probably the best we've had in a long time. So it is getting better.

I understand what you are saying, but the law says that this document is under our bureau, but we asked other agencies to see it and help us with it. But as they say, somebody has to be the point group on it or point person, and that's us. And of course, all our colleagues can see these comments. And we will do what we can to spread the word, sir.

MR. ELIJAH ROCK, SR.: And you also explained that there is a law. If we break the law, we go to jail.

DR. JIM KENDALL: And if we break the law, we would probably go to jail, too. So we are doing our best to follow the law. That's why I have lawyers to help me. Hi, Liz.

MR. ELIJAH ROCK, SR.: We are on the same boat. Whether we say we want this or we don't want it, it doesn't make any difference what we say here. The government has their opinion and their laws that will certainly be something that will be the outcome. The law and the government will do whatever they can, whatever they want.

DR. JIM KENDALL: I think we are all in the same boat, and I can assure you your comments will be

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taken with us and put forward.

MR. ELIJAH ROCK, SR.: Thank you.

DR. JIM KENDALL: Thank you. Anyone else before we close? Yes, sir.

MR. BILLY STONE, SR.: What he's trying to say is probably we're the ones that live up here and you guys are the ones that are receiving what you get from our waters.

DR. JIM KENDALL: You are correct, and that's why we are here. And your name again, please?

MS. BILLY STONE, SR.: Billy Stone.

DR. JIM KENDALL: Thank you. That's why we are up here. We wish we could come up more. I was telling some of the other Elders, anytime you are in Anchorage, you can stop in our office. We have got nothing to hide. And we appreciate everything we get from you. Any more?

MR. JIM NASH: The money made on Lease Sale 193, where did the money go?

DR. JIM KENDALL: That went into basically the Federal Treasury, but there are some calculations there. And I don't have all the details with me. That's why one of the other gentlemen was talking about revenue sharing. That's something the Congress has been talking about for a long time.

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MR. JIM NASH: Does that go with any other oil field or any other exploratory wells?

DR. JIM KENDALL: Well, the federal waters belong to the federal government, and the revenue comes into the federal government.

MR. JIM NASH: What happens if there is evidence of water use that predates the federal government?

DR. JIM KENDALL: That would be interesting.

MR. JIM NASH: Would like some jaw bones, if they were tested and dated that predate any time that the federal government was here, would that be taken into account, also?

DR. JIM KENDALL: Are you talking about archeology sites?

MR. JIM NASH: Not even just archeology sites because common practice sometimes is after a whale is caught, a jawbone gets sent back into the ocean. And that's been going on for quite a while. And if they were to find some of those jaw bones, the old jaw bones, and do the carbon testing for dates, and if any of that were to predate any federal government involvement, then by law wouldn't that mean that's our waters?

DR. JIM KENDALL: That's an interesting

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concept. I'm glad you told us, and we have got it in the record. Fascinating.

MS. LILLIAN AANA LANE: Put yourself in this scenario. How would you feel if we took your cows, your pigs and your chicken away from you?

DR. JIM KENDALL: That wouldn't be a good thing.

MS. LILLIAN AANA LANE: That's how we feel.

DR. JIM KENDALL: Absolutely.

MS. LILLIAN AANA LANE: Thank you.

DR. JIM KENDALL: Thank you. Anyone else? This is a good conversation we had tonight.

MS. PEGGY FRANKSON: Are you getting very many input from other communities?

DR. JIM KENDALL: I wasn't to the one in -- Sharon, could you address Kotzebue?

MS. SHARON WARREN: Yeah. We went to Kotzebue and we had a public hearing in Kotzebue and we had a few that were testifying. We got a lot of good comments onto the record. And another thing that was brought out and I just wanted to pass on -- the question was asked where can you see the communities.

When we put out the final Environmental Impact Statement, what Mary is doing is she's doing a transcript.

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All those transcripts will be in that document so you will be able to see also what other communities have said in the final. What also is -- a lot of times we get the transcript pretty close to the time.

We also put them up on the website even before we get the final out so you will be able to see what was said in those transcripts, as well, for all the sites. And same with the regulations.gov. When individuals put their comments in, we put them on the website as soon as they come in so you can see who has all commented to date on the regulations.gov. So you will be able to see -- as people start putting their comments in, you can go on that site. And even if you are not ready to put your comments in, you can see everybody who is putting comments in and what they are saying.

MR. STEVE OOMITTUK: So you could read the other comments from the other communities as they come in?

MS. SHARON WARREN: Correct.

MR. STEVE OOMITTUK: They have till December 22nd, 8:00 p.m., and that's when it stops?

MS. SHARON WARREN: Correct.

MR. STEVE OOMITTUK: So if we wanted to write in more comments, we could go to this website and --

DR. JIM KENDALL: Yes. It's just not tonight. We wanted to come out here personally, but you

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can go home, think about it, you know, see what other people are putting up there, and add yours. Anyone else?

MR. TARIEK OVIOK: I have a question for the record. That was an interesting thing that Jimmy Nash brought up concerning the jaw bones in our ocean as far as the head bone when we catch a whale. The -- what -- in your -- just based on personal communication, in your opinion would you agree that since this involves study and based on what Mr. Nash has just said, that there has not been a thorough study in regards to the traditional perspective?

DR. JIM KENDALL: I would have to ask my experts on traditional knowledge that work with the tribes on a more regular basis than I do about that.

MR. TARIEK OVIOK: I mean, that's a simple -- that's a simple question. I'm asking you. Based on what he just told you that that is a part of our custom, you responded to him that that was interesting and that you have not heard about that, which is understandable. So just based on conversation and question, based on what you heard there, would you believe that there hasn't been a thorough study in perspective of the traditional knowledge?

DR. JIM KENDALL: I would have to ask my traditional knowledge folks. I cannot answer that.

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MR. TARIEK OVIOK: But we are the traditional knowledge folks. We just fed you that information.

DR. JIM KENDALL: And we have people on our staff that has worked with the whaling captains. Heather.

MS. HEATHER CROWLEY: Well, we have a very broad-based environmental studies program. One aspect of that is social science and traditional knowledge. We have had quite a few studies over the years and very recently including traditional knowledge, including mapping of subsistence hunting activities, particularly in the water, the oceanic, so the whale hunts, the seal hunts, that type of thing. We haven't focused as much on the terrestrial hunting, subsistence activities in our current studies.

We also have a study that we are starting up right now that will involve organizing panels of people from the various villages. I know the boroughs, both the Northwest Arctic Borough and I believe also the North Slope Borough, will be involved in that to establish sort of panels who can help us to guide us in incorporating traditional knowledge into our scientific research.

MS. MAE HANK: What about the tribes?

MS. HEATHER CROWLEY: The tribes and -- yes, it will be a broad base, and the tribes and the

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villages and the boroughs will be consulted. At this very early stage, the boroughs have helped us develop our plan for this study, but this study is not off the ground just yet to establish these panels. And we have done a large number of studies over recent -- we had a recently completed study examining the sharing networks among the villages on the North Slope. I don't remember exactly which villages. I'm an oceanographer by training, so I am not deeply involved in those studies. But I am -- as the studies plan coordinator, I am very aware of them. But I can give you further information and help you find -- and give you my contact information.

MR. TARIEK OVIOK: So while those panels are being established, these decisions are still going to go forward?

MS. HEATHER CROWLEY: They are -- they are different -- basically, yes, because they are somewhat different processes. We have been developing -- we have been conducting studies over many, many years. Our studies program is over 40 years old and including the social science studies, including some of the -- incorporating traditional knowledge into our studies. So we have -- we have been doing this all along. It's just that that particular study with the TK panels is just one of the ones that's coming up right now.

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MR. REX TUZROYLUK: I want to make a comment as far as water rights. And these two gentleman, I'm so glad they brought this issue of water rights. In 1865 our great chief, Chief Attungowruk, was competing with a system for the candles and the girdles. And I'm sure if the Department of Interior could have knocked on his door or whatever it was in 1800s, but -- Point Hope was part of the commercial whaling. Our chief was a great whaler. He provided these things for us. And even though there were other countries that the British -- you know, in 1865. And these two young men bringing up the water rights, I think we should visit these things. We have been here a long time again. Thank you, gentlemen.

DR. JIM KENDALL: Thank you.

MR. STEVE OOMITTUK: Yeah. You know what Jimmy is talking about, like he said, we have been here for thousands of years, you know. We have been putting the whale's head in the water after we catch it for 2,000 years. We believe in the reincarnation of the animal that has fed us for -- our graveyards, our houses, our peace grounds are made from the whale jaw bones. When we catch a whale, we always push the head back into the water when we are all done because it comes back to us. And we have been doing this for -- we are considered one of the oldest continuous habitants in North America. We have been here

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for thousands of years hunting and gathering these same animals.

And this is why we are so concerned. This is why we want our, you know, future generation to be able to do the same things what we have done, what our ancestors done that has been passed from one generation to another. We don't want this to die because if it dies, we die with it. It's our identity. It's our way of life. It's who we are as a people. We want to continue. We want our younger generation to have that same thing that we had as we were growing up.

Now we are seeing all the changes, but, you know, our food source -- like we said, we are subsistence hunters. We have -- we are a very low income community. We rely on the ocean. And that's our concern. That's our food source. We want to protect it. We want to make sure that we continue eating off the ocean. And when we are gone, our kids continue and their kids. We are not just thinking of ourselves. We are thinking of the future, also.

DR. JIM KENDALL: Thank you. Any final comments? Okay, then. With that, I'd like to close the meeting out. And thank you very much for coming tonight. I know it's been a long time. These are very serious matters. We will take all your comments back with us. We

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are going to another village. We were in a village last night. Please submit any additional comments. We have got nothing to hide. We will put it together and we will pass it forward. That's our job, and we want to do it well, and we want you to be part of the process. So thank you very much for the long meeting tonight.

MR. TARIEK OVIOK: Thank you for adding the extra time for us to speak.

DR. JIM KENDALL: Our pleasure. And have a good rest of the week.

(Proceedings adjourned at 10:13 p.m.)

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REPORTER'S CERTIFICATE

I, MARY A. VAVRIK, RMR, Notary Public in and for the State of Alaska do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that the proceedings were reported stenographically by me and later transcribed under my direction by computer transcription; that the foregoing is a true record of the proceedings taken at that time; and that I am not a party to nor have I any interest in the outcome of the action herein contained.

IN WITNESS WHEREOF, I have hereunto subscribed my hand and affixed my seal this _____ day of _____ 2014.

_____
MARY A. VAVRIK,
Registered Merit Reporter
Notary Public for Alaska

My Commission Expires: November 5, 2016

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BE IT KNOWN that the aforementioned proceedings were taken at the time and place duly noted on the title page, before Mary A. Vavrik, Registered Merit Reporter and Notary Public within and for the State of Alaska.

P-R-O-C-E-E-D-I-N-G-S

(Prayer offered by Rossman Peetook.)

DR. JIM KENDALL: Thank you very much. Thank you for coming out tonight. I will keep my comments brief so that we can jump into the presentation. But this is a real important meeting. If you see the stack of big blue books over there, those are draft documents. We need you to help us make it better. The decisionmaker, the Secretary of the Interior, is going to be the recipient of this document, and she will use that material and other stuff she has at hand to make a decision about a lease sale we had in 2008. We had to redo a part of it. And Mr. Routhier is going to go through and explain what that is.

But this is important. Our goal is to have the best document that has the most information in it. It's not just science. It also includes traditional knowledge and what you think is important. So anything you tell us tonight we need to capture by Mary taking the transcripts.

Now, aside from you all, she is the second -- you are the first most important people in the room. She's the second most important person in the room. So if you decide to say something, ask a question, give some testimony, give your name to Mary so she can give it -- write it down. And also speak loud enough so she can get

what you say because that information is going to be put together in our analysis. And after they go through and they verify everything is okay in terms of spelling and stuff, it will go up on the website so that everybody knows we are being transparent and people can see all over the country what you said, including the Secretary.

If you happened to bring something with you in writing, you are free to give it to Mary. That will help make her record accurate. So that's the whole point. All right? And I think I probably said enough. So please speak loud so Mary can hear you. Give her your name. That will be very important. Anything in writing that you have, please provide it to Mary. She will make sure her record is correct.

And with that, I'm going to turn it over to Mike Routhier and Betty. They are the manager of the project, as well as Betty's an engineer to go into some of the details if you have questions. So Mike and Betty, let's go through the presentation for our new friends.

MR. MIKE ROUTHIER: Okay. Thank you, everyone. As Jim said, we are here to talk to you tonight about this document we are producing. It's called Chukchi Sea OCS Oil and Gas Lease Sale 193 Draft Second Supplemental Environmental Impact Statement. All that means is that it's an environmental analysis that we did

on -- to try to understand the effects, the potential effects of leasing areas of the ocean for oil and gas.

And first we will do our background information about who we are and what we do. As Jim said, we are the Bureau of Ocean Energy Management, so we are a federal agency. We are not an oil company. We are within the Department of the Interior, and we're here to talk about this document that we prepared. And we are also here to get your comments on that document.

So what does our agency do? Well, our primary responsibility is managing energy and mineral resources on the Outer Continental Shelf. That's basically the seabed from three miles to 200 miles out in federal waters. And we do so in an environmentally and economically responsible way.

And there is a variety of different activities we do. We manage a five-year leasing program. We oversee exploration and production plans, so we review any plans that companies submit to us asking us for our permission to do something. We do environmental reviews. We do a lot of studies out here in the Chukchi Sea, and we evaluate resources.

So I spoke about a few things that the Bureau does. And there is actually an order in which these things happen. They don't all happen at once. There is a

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multistep process that unfolds over time. It starts with developing a five-year program where the Bureau looks at parts of the ocean all over the country, and it identifies areas that might be suitable for leasing.

Then it plans for individual lease sales. We might say, okay, well, it might be a good idea to have a lease sale here. Let's do some more review in that area and see if that's a good idea. If leases are sold, then the company that buys a lease has a right to submit a plan. They can propose doing certain activities, drilling, et cetera, and we would review that plan on a plan-by-plan basis. If we give an approval and if they find what they are looking for, then they can submit the development and production plan where they say, okay, we want to develop this area and produce the oil or natural gas that we find there. But it's important to remember that it's a very -- it's a multistep process that happens over time.

Now, in this case we are at the second step in the process, the individual lease sale stage. We are looking at one particular lease sale. That particular lease sale is Lease Sale 193. You may have heard that term before. This -- back in 2007 is when the agency started looking at the Chukchi Sea once again, and we did an environmental review to help decide whether to have a

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lease sale. And the agency did hold a lease sale in 2008, and it sold many leases in the Chukchi Sea.

Later there was some litigation, and the District Court here in Alaska found that something in the environmental analysis we did was wrong, and so they told us to go back and fix it. We did. We created a Supplemental Environmental Impact Statement. And you may recall some of us being here a few years ago in 2010 and 2011. And that's what we were here to discuss back then was that document. The District Court found that, yes, we did our job, we fixed that mistake, and we went forward.

However, in that litigation, it was appealed to the Ninth Circuit Court of Appeals, the higher level of court. And they appealed two issues. And the Court said that on one of the issues, no, that the agency did fine, that's not a problem. On the other issue, the Court found that there was a deficiency with that 2007 document, the old EIS, the first EIS we did in this process.

And this occurred in January of this year is when the Court found that deficiency. More specifically what the Court said was that the exploration and development scenario of one billion barrels, that basically the agency had to go back and analyze more. We had to do more analysis because what the agency did was analyze just the one-billion-barrel scenario, but they

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said, well, if that first billion barrel development happens, then more could happen, but they didn't analyze the extra that could happen. The Court said, no, you can't do that. You have to analyze everything that might happen or that could happen as a result of this lease sale.

And so they instructed us to do more analysis, analyze a bigger scenario, basically. And that scenario -- we will talk about the scenario -- is 4.3 billion barrels. So it's a much bigger scenario. And by "scenario," by the way, I just mean holding a lease doesn't give the company the right to go out and do something. They have to submit plans. Just the lease sale process is very early in the process. But to understand what kinds of environmental effects may occur, we have to give some sort of projection or estimate of the activities that might unfold all the time. And it's fairly hypothetical. It's far into the future. But we need that scenario of activities so that our environmental analysts have something to look at so they could all look at the same thing and start to estimate the impacts.

So when we began doing this document, we realized, well, let's get some help from other agencies and other governmental entities with expertise in that area. We want to make sure we do a good job on this. So

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there are many cooperating agencies that helped us prepare this draft document. They include the Bureau of Safety and Environmental Enforcement, which is the agency that does the inspections and enforcement on any drilling activities that take place; the Bureau of Land Management, State of Alaska, and also the North Slope Borough and the Northwest Arctic Borough. They all helped us produce this document. We have had teleconferences and they reviewed our drafts. There are also several participating agencies: EPA, Fish & Wildlife Service, NMFS and the Coast Guard, et cetera.

So this environmental analysis, it's a NEPA analysis, the National Environmental Policy Act. And under that law it requires agencies like ours to not only explain the potential impacts of the activities, but to present alternatives. So we have four alternatives in this document. Basically the decision that the Secretary is going to have to make is whether to affirm the lease sale, basically say, yes, holding those -- that lease sale in 2008 was a good idea and we want to keep all those leases, or the Secretary could choose the No-Action Alternative, which is saying we don't like that decision to hold the leases. We don't want to have them going forward.

Or there is also this Alternative 3, which would

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give a wider corridor away from the coast because we understand that the areas near the coast are very important for marine mammal migration, for subsistence activities. And so one of the alternatives would mean a larger corridor away from the coast. And just for context, the leases that exist right now are roughly, would you say, 50 miles or more from shore. This is them depicted on a map here. I don't know how well you can make out these little squares, but these little squares are leases that were leased through sale 193. And of course, Wainwright is right here [indicating].

What's really important to understand here is that no new areas would be offered through this process. There won't be any new leases issued through this. We are not looking at other areas to lease. The highest amount of leases that could occur from any of this is just what's already under lease. It would be forming existing leases. It wouldn't be leasing anything new.

And at this point -- I talked briefly before about the scenario, the hypothetical set of activities to be analyzed. And that's where my colleague Betty Lau was the primary author on the scenarios, so she can fill you in on how we developed that.

MS. BETTY LAU: Okay. As Mike told you, the Court said that they didn't like the way we did our

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original analysis for the one billion barrels. So with my colleagues, we went back to the very beginning and we looked at everything again and did a whole new analysis. And this triangle tells you something about the way we think about how much oil could be produced as a result of a single lease sale. So we start with all the possible prospects that could be out there in all of the Chukchi Sea. So we are talking about everything that's in the Chukchi Sea planning area at the top here.

Then we think about how much of that oil do we have the knowledge to bring out of the ground and produce of all those. So that's where we get this 15.4 billion barrels that we could technically produce with the knowledge that we have right now. Then we have to think about economics because oil companies are in business to make money. So of those 15.4 billion barrels, how many of those could you produce and still make money if oil were -- and the price we used was $110 a barrel. Of course, we know it's -- the price has gone down from there, but it takes time to do these analyses, so we chose that. And that takes us down to 11.5 billion barrels.

But we are not talking about all of the Chukchi Sea as a result of Lease Sale 193. We know the area that was leased. So it's a small set of what was leased. And then we have to think about what could you produce before

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some of the leases start to expire, because they are leased for ten years normally. Now that they have had court cases and the operators could not use their leases, they have been -- those leases have been extended because of the litigation. But the original leases were written for ten years. And if the operators do not go out and drill wells in those leases, they begin to expire. So there are a limited number of those leases you could possibly drill on within that ten-year period.

So what we came up with for Lease Sale 193, plus any additional lease sales that might happen because we are proposing if there were a successful project as a result of 193, then you might have another lease sale, more leases might be bought then. And so we came up with a total cumulative for Lease Sale 193 and later lease sales of 6.4 billion barrels.

And of those 6.4 billion barrels, we are thinking that we would have one big what we call an anchor field, one big field that would be really the money maker. And if you had one big one, you might be able to have one smaller one, as well. And the total of those two combined would be 4.3 billion barrels, which is quite a lot more than the one billion barrels we had originally come up with.

DR. JIM KENDALL: Betty, could you explain

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that because this analysis is taking place after the lease sale, that we have a better idea where they would drill, and now we can more focus on what we actually think is there, that four billion barrels?

MS. BETTY LAU: As Mike said, in the original analysis it was a minimum economic field size of one billion, plus something more if that were successful. And what we did is analyze what that something more could be. So that's why we have a bigger number this time.

Okay. So we -- the scenario -- I had the 4.3 billion barrels, and with the other people I work with, geologists and engineers and economists, we came up with this idea that you could have an anchor field that had 2.9 billion barrels, and then your smaller satellite fields that then could be developed for another 1.4 billion barrels. Associated with those fields is 2.2 trillion cubic feet of natural gas.

Now, this is much bigger than what we have done before. Our assumption is, you know, when you start producing oil, what comes out of the ground is oil and gas and water all together. Our assumption is that this would be produced the way they are producing Prudhoe right now, producing the oil and gas and water, but putting the gas and water back in the ground for now to be produced later.

Right now we don't have a big pipeline where we

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could get that gas to market. We do have TAPS, and we are assuming that the oil -- there would be a pipeline built from the offshore platforms to shore and then to TAPS to plug into that. And we are assuming that a big natural gas pipeline is in by the time we get all the oil produced and we are ready to start bringing the gas back up for sale. So then we are assuming a similar development where you bring the gas up. We have another gas pipeline to shore, another gas pipeline to Prudhoe, and then it would go down that big gas pipeline.

So the whole scenario takes 77 years to complete. That's from your first seismic to your exploration wells, waiting for that successful well, and then making sure that your field is big enough that it would be worth your time to produce, and then getting in the infrastructure, the pipelines, the platforms, the wells that you would need, producing it and then decommissioning it -- decommissioning it and cleaning up when the oil is gone, then taking things out, plugging those wells with cement. So all of that -- all of those activities happen in those 77 years.

That's it for me.

MR. MIKE ROUTHIER: Okay. So now that Betty's group has created this hypothetical set of activities, we then turn over those activities to our

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biologists, our oceanographers, our social scientists and ask them, if these activities happen, what kind of effects would occur, what kind of environmental impacts would happen if all these oil and gas activities would occur. So in doing this effects analysis, we considered a lot of new information, including information from the studies that our studies program conducts.

We look at what about these activities had the potential to cause impacts, and then we look at how those impacts would unfold over the 77 years of this scenario. It's not only a very large scenario, but it's a very long scenario, and we just track those impacts over time.

We also look at the risk of oil spills occurring. We look at where spilled oil would go if something like that did happen. And as far as oil spills are concerned, we looked at a potential for small spills, large spills, and then we had a hypothetical very large spill analysis. And that was something in the previous document. That's something that the agency did after Deepwater Horizon happened where we said, okay, this is very, very unlikely, but it is possible, so we should at least let the decisionmaker know about what the effects would be here in the Chukchi Sea and on the North Slope if something like that happened. It's important information. And before affirming the leases, the Secretary should know

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about that. So we did include that analysis in this document, as well.

Another thing the document looks at is cumulative impacts. In other words, while we know that it's not just oil and gas activities that have the potential to affect the environment here, it's a lot of other things, as well. Talking about climate change or vessel traffic, tourism, recreation, military activities, mining projects, any other activities that could affect the environment in the Chukchi Sea and on the North Slope we consider.

And finally, I'd just like to talk about next steps in this process. So we have released this draft document. Okay. That triggered a comment period. We are in that comment period right now. There is a little over a month left in that comment period. That closes December 22nd. Once the comment period closes, we are going to review all the comments that we have gotten during the comment period, and we are going to start revising the document based on those comments. And we will start responding to those comments in writing, and we will compile all that information and eventually release a final document, a Final Supplemental Environmental Impact Statement. We expect to release that final document in February of 2015.

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As soon as 30 days after we release that final document, the Secretary of the Interior can make her decision about whether to affirm, modify or vacate leases sold in Lease Sale 193. So she will make her decision about whether to have these leases out in the Chukchi Sea.

As far as submitting your comments, as Jim mentioned, our court reporter is here and she will be producing a transcript of everything that's said at this meeting. So you can give your comments here tonight verbally. Tell us what you think about the document. Tell us what you think in general about oil and gas activities in the Chukchi Sea. Or if either you don't wish to speak tonight or whether you want to review the document before making comments or something occurs to you later that you think is important you want to share with us, you can submit your comments on-line. And the government maintains a website called regulations.gov, and you can go there and type in your comments. You can also look and see what comments other people have left. And once your comments are in there, we will post them and people will be able to see your comments.

We have listed the website here, but also we have a handout that describes in more detail how to go about using regulations.gov. And they give you the website, show you what it looks like. It will show you

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where to click and where to put your comments.
That concludes the presentation.
DR. JIM KENDALL: And with that, since we have not too big a crowd, what I'm going to propose we do, we take a five-minute break. Everybody can get some refreshments. Then we will put the chairs in a circle so everybody can see everybody else so we will have a talking circle and say who wants to contribute to help us make this document better.
MR. ROSSMAN PEETOOK: Good idea.
(A break was taken.)
DR. JIM KENDALL: I think we got a good time to start. As I said at the beginning, this is a genuine process. Everything you say we take seriously. We get it recorded. We study it and we make sure that it's correct, and we put it on the Web so other people can see what you are saying, so they may have an aha moment, like, oh, my goodness, Rossman said this. I think I can add to that.
So with that, how about, Rossman, could we start with you? Is there anything you would like to add or comment on?
MR. ROSSMAN PEETOOK: Our leaders are gone. They are at a meeting.
MR. MICHAEL HALLER: The council is in

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Anchorage for meetings, the Alaska Municipal League.
DR. JIM KENDALL: Okay.
MR. RAYMOND NEGOVANNA: He's hard of hearing.
DR. JIM KENDALL: So am I. But we can stay here as long as -- we will stay here as long as we need to. We are not in a hurry. So we just want to go around the room many times to make sure anything you think about -- so would anyone want to start on how do we do this better? You know, anything can be said. We are here. This is your meeting.
MR. HOWARD PATKOTAK: Howard Patkotak, for the record. I'm with the Wainwright Traditional Council. It's actually called Native Village of Wainwright. I gave my comments this afternoon at our tribal office this afternoon. I just want to hear what you have recorded on our side. That way I can pick up what we want from the tribal side. I'd like a playback of what we did this afternoon.
DR. JIM KENDALL: Mike has the notes. He took notes.
MR. HOWARD PATKOTAK: For the record, Terry Tagarook and I met with BOEM, and also one of our tribal council members on that teleconference. I just want to hear what I actually said, what Terry said so I

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know it was recorded as -- as we stated.
DR. JIM KENDALL: And Mike was there taking notes, and he's going to get the page right there and try to capture it a little bit.
MR. MICHAEL HALLER: Okay. And Mr. President, you are welcome to correct me anywhere along the line, please. Okay. So these are summary notes from our government-to-government meeting this afternoon. We explained -- we took the time to explain exactly in kind of a different -- slightly different way what we presented tonight, a mini version, if you will. We walked the President and his council, Terry and others, through that; Edward, who was there; Terry and Edward and Sonya. And we talked about increased regulations and permits, talked about the increase of shipping and need for monitoring. And there was mention of reports -- reporting to the tribes of who is traveling up and down through the Bering Straits and through the area and sort of all phases of that, whether it's commercial shipping; it might be military shipping, industry and so forth.
We talked about fish habitats and the areas and the rivers and streams that feed into the straits. We also talked about the need for cleanup capacity associated with industry activities. We discussed the 77-year life cycle that was referred to tonight in the presentation,

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explored that. We talked about the need to work closely between the tribe, the community, the Bureau of Ocean Energy Management and all the various government agencies, federal and state and region; the Borough, as well.
There was some brief discussion, very brief discussion about potential for compensation for any damage that could occur during any phase of exploration or production that would be from the energy companies to the community, to the tribe.
We talked about improving safety during all phases of exploration and production. And we emphasized that this plan, this draft plan that is being discussed tonight and earlier this afternoon is, in fact, just an exploration plan. It's a draft of an exploration plan. And discussed the four alternatives that were on the slide with you, Michael.
And then we highlighted a couple of upcoming activities that we, the Bureau of Ocean Energy Management for the Alaska Region, will be involved with, meaning that not only will we be back in the village to visit with you some more about these 193 activities, but we are also going to be back up here to talk to you about the five-year -- coming five-year program as early as this January and also the Arctic standards which we, the Bureau, do not have an actual date lined up yet in terms

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of telling you when that might be, but we know it's coming soon. We believe it is.

And then we excused ourselves for a few moments, and we had the opportunity to take a view of your subsistence hunting and fishing maps to get an idea of their locations and a little bit of familiarity with them so we can see -- thinking about our map here and thinking about the map that you use pretty much every day that you are familiar with in your lives, we became more familiar with that. And we expressed our appreciation for that.

We talked about air quality briefly, that perhaps 40 miles is even too close for operations relative to position of the community to where some of the work may, in fact, be going on. A greater distance would be better if there was a preference. And that we should pay attention to the currents, again with reference to hunting and fishing and just general activities throughout the area.

And that was the highlights that I got.

DR. JIM KENDALL: And we did mention -- you shared with us your concern about the Russian stuff going over there could end up on your doorstep and talked about how a lot of the other Arctic countries are worried about that, as well, that we don't -- if it happens, we'd better do it right because some other group may do it

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wrong. And also mentioned that -- you didn't quite use the term. You kind of referred to revenue sharing, that the community somehow should get some type of compensation for that. It's not in our power, but we need to take that message back.

And one more thing. With the change in administration, you were saying that you would welcome some of the Washington, D.C. bigwigs to come up here and talk with you and see for themselves what's going on. Did I get that right?

MR. HOWARD PATKOTAK: Yeah. We want the top leaders to come down to Wainwright to -- they can see who we are and how we live and get our input, rather than reading it from some newspaper or report.

DR. JIM KENDALL: It's written down, and we will see what we can do. Be careful what you wish for.

MR. MICHAEL HALLER: Was there anything else you wanted to add to that, Howard?

MR. HOWARD PATKOTAK: I'll keep thinking.

DR. JIM KENDALL: Who else wants to share?

MR. ROSSMAN PEETOOK: Within five years' time, how many oil rigs are going to be out there?

DR. JIM KENDALL: How many rigs in five years?

MR. ROSSMAN PEETOOK: Yes. How many

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development?

DR. JIM KENDALL: Okay. The development would be many years away if an exploratory well is successful. In our possession now is an exploration plan from Shell where they are proposing to have two rigs either in 2015 or maybe 2016, maybe. But we cannot officially approve that plan until we get this exercise done. But on the horizon from what we have in-house, there is only two rigs that we could anticipate in the next one to two years. If they were to find anything and if they decided to move forward, they would have to figure out how they are going to develop it. They haven't given that to us yet. So they are going to have to figure that out. And it could be another two, three, or four years before they give us that.

And then -- and then if that gets approved, they have to figure out all the agencies they have to work with to get a pipeline across the Slope to TAPS. So development is probably no closer than -- Betty, I'm going to guess five years at the earliest.

MS. BETTY LAU: Oh, yes. That would be very early on.

DR. JIM KENDALL: And then actual production could be ten years away. Is that a good guesstimate?

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MS. BETTY LAU: Yes.

DR. JIM KENDALL: This is the very beginning of the process. And one thing we have to remind folks is that when a company gets a lease, it doesn't entitle them to do anything except turn in an exploration plan for us to consider and maybe approve it if it's by the law. And then even if we approve it, our sister agency, the Bureau of Safety and Environmental Enforcement, they have to be submitted from the company an application to permit to drill, and that agency goes through all the engineering specifications to see if what they are actually proposing to do, if that piece of ground is technically safe.

So it's a long process, and it was intended that way so decisions are not made too quick, that there is plenty of time for discussion like this to get new science, to borrow your traditional knowledge to see if it helps us make a better decision.

It's like when Mike said that there was an area there that was 25 miles out where there is no leases, well, that was based not only on the science we did, but also on the traditional knowledge from the coastal communities that alerted us that in that corridor that's where the bowhead whales migrate, that's where they have their young, and that's where they feed. And so the

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Secretary said it doesn't make sense to have any leases there. So that was off limits.

That's how we use traditional knowledge. It's a good check to make sure if we did the science right.

MR. MICHAEL HALLER: There is a good map of an example of that right over there [indicating].

DR. JIM KENDALL: Questions, comments? Please help us make this a better document. And again, if you want to spend time looking at it, you can put more comments to us at that website. And it goes back up on the website so all your colleagues and fellow villagers and hunters can see it and maybe add to it. We want to be as transparent as possible. Nothing to hide.

MR. ROSSMAN PEETOOK: Are they going to finish the 487 leases within five years' time?

DR. JIM KENDALL: That's a good question. Right now they are all in suspension. When the Secretary -- or when the Court said that we needed to revise this document, all those leases were given a suspension of production, which means the clock stopped.

MS. SHARON WARREN: Suspension of operations.

DR. JIM KENDALL: Suspension of operations. Excuse me. Suspension of operations. So the clock is not running. It adds that many months or a year

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or so to the leases. But they do expire, and they can expire. The only way they can continue is if there is a good faith effort to explore and develop those leases. But as many of you know, all of those leases are the result of the lease sale in 2008, you know, the leases way before that time where they actually did some drilling -- how many wells were drilled in the Chukchi?

MS. SHARON WARREN: Five.

DR. JIM KENDALL: There were five wells drilled in the Chukchi 20 years ago. All those leases expired and they are gone. This is the next batch. And if nothing -- if the companies do not demonstrate due diligence and get out there and be successful or give it a development plan, they, too, can expire. They do not own those leases forever. And then as Mike said, if things were to progress and there is decommissioning, what that means is they have to leave the ocean floor exactly the way they found it.

MR. JOSEPH AHMAOGAK: Joseph Ahmoagak. I have a statement. Good evening. Thank you for the opportunity to provide comments on the Draft Second Supplemental of the Lease Sale 193 Environmental Impact Statement. My name is Joseph Ahmoagak. I am a director of the Arctic Inupiat Offshore, known as AIO. I am also the Chairman of the Board of Directors for Olgoonik

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Corporation.

OC is a for-profit corporation created under the Alaska Native Claims Settlement Act, ANCSA, with the purpose of providing economic benefits to our shareholders. OC has 501 shareholders, most of whom reside here in Wainwright. OC is a member of Arctic Inupiat Offshore, AIO, which has made an investment in the leases that were sold under Lease Sale 193 and, therefore, we have a strong interest in the draft SEIS.

One thing the federal government did not do when it sold leases in Lease Sale 193 was to deliver revenue sharing to the communities closest to exploration through federal impact funds. The results were that the coastal communities of the Chukchi Sea would assume the risk of changes to our oceans and sustenance through drilling, but we would not receive any of the benefits. The situation created frustration and strong opposition to the OCS in our community. It created division within our culture in a place where we have to be good neighbors. We were frustrated that the federal government went forward despite our concerns. Really what we were provided was a public process that asked for our input after the fact.

The rifts in our communities created an opportunity for outside interests to prevail and to try to speak for us, represent us and use us. There have been

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many lawsuits filed, and this draft SEIS is a result of such legal action.

In Wainwright, we have decided to be proactive and have tried to plan for the exploration in our offshore. Every time there is a lawsuit it creates delay that has negative economic effects on our corporation. We decided to take things in our own hands, and OC joined along with five other village corporations and our regional corporation, Arctic Slope Regional, to form Arctic Inupiat Offshore, AIO. We felt we needed to do this because if OCS was going to happen, then we needed to find a way to get some real benefit and not just all the risk. We did something that we never contemplated before. We bought an interest in the leases that Shell owns.

So despite the fact that we took to the federal government -- we looked to the federal government to take into consideration our needs, we took it upon ourselves to engage, and now we have a seat at the table and have the ability to help guide Shell in its operations and to make them safer for our communities and environment. This is very important, and it's important to our shareholders and residents to understand. We have the ability to influence their program. And if they are successful, then we will also get the reward and be able to pass that on to our shareholders through dividends. We need to be actively

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engaged.

My comments on the Draft Second Supplemental for Lease Sale 193 EIS will be short. First, we have not been afforded the time to thoroughly review the draft document. We understand that the scope of the draft SEIS is very narrow as defined by the Ninth Circuit Court of Appeals in its remand. Thank you to the Bureau of Ocean Energy Management, BOEM, for releasing the draft SEIS in a timely manner. Arctic Inupiat Offshore, AIO, will be providing more extensive written comments on the draft SEIS prior to the end of the public comment period, which ends December 22nd of this year. We do ask, though, that BOEM maintain its schedule and not let it slip so that we can have a timely Record of Decision issued and hopefully close this matter about Lease Sale 193 once and for all.

Thank you for your time and attention. Additional more detailed comments will be forthcoming.

DR. JIM KENDALL: Thank you, sir.

MR. MICHAEL HALLER: Thank you. May we have your comments?

MR. JOSEPH AHMAOGAK: Yes.

DR. JIM KENDALL: That will make sure that our notes are correct or accurate.

MR. ROSSMAN PEETOOK: I didn't have time to write.

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DR. JIM KENDALL: But you speak very well, and she's a good recorder. Those are very good comments. Thank you, sir. We take that to heart. Who else wants to share with us? We need help. We want help. Anything we can do better?

MR. ROSSMAN PEETOOK: Are they going to work year-round if they start developing?

DR. JIM KENDALL: The exploration plan we have in now that if -- if we -- we will get this -- we will get this done on time. If Shell chooses to drill according to their exploration plan, it's only during the open water season, not in the winter. Now, of course, in the future if there was production, that would -- that would be year-round, but that's after the wells are drilled and all the pipeline and stuff is laid. But that could be years in the future. But for now, it's open water only.

No one has to be shy here. We understand it's a big document, so as you pointed out, you just got it not too long ago.

MR. JOSEPH AHMAOGAK: We just got it the other day in the mail. I just got a hard copy along with the CDs just in the mail the other day. I just opened it up.

DR. JIM KENDALL: You have, like you said,

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till December 22nd. Take your time and look at it. Get us your comments. As you understand and pointed out, for us to keep to the schedule that the Court said, we have to run it this way, but we wanted to make sure you saw that there is real people working on it. The people that are with me are working around the clock, you know, and they are turning over every stone to get information. They are talking with everybody they can. Our colleagues with BLM, the Northwest Arctic Borough has given us some input. The North Slope Borough has given us input. Then the participating agencies, EPA, Fish & Wildlife Service.

How often do you talk with National Marine Fisheries Service and Fish & Wildlife?

MS. FRANCES MANN: Every week these days.

DR. JIM KENDALL: Every week. The North Slope Borough calls in, Northwest Arctic Borough. Everybody's logo is going to go on this, so it has to be a good document. So we want to make sure it's a good document so that when we set it down in front of the Secretary of the Interior, the decisionmaker, we can look her in the eye and say, it's a big document, but we covered everything we could get our hands on. Of course, nothing is ever perfect, but we are going to try to get as close as we can to perfect. We don't want to be

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embarrassed, and we don't want to embarrass you.

MR. ROSSMAN PEETOOK: We are lucky today because I never see heavy ice anymore from -- from the '70s. We don't have any solid ice due to global warming.

DR. JIM KENDALL: And that's covered in the document. That's correct.

MR. ROSSMAN PEETOOK: Global warming starts in the '70s. We know that. I know that.

DR. JIM KENDALL: So you knew it before all the scientists did.

MR. ROSSMAN PEETOOK: And today I never see heavy ice out there anymore. No solid heavy ice. But the ice start building up. It start piling up together, and finally we can -- we can find a place to pull the whale up where the piles start. It's hard to find that heavy solid ice in order to pull the whale. So I don't know about five more years. Maybe there will be no ice out there. Who knows. But the global warming is over. We know that. I know that forty-three years later.

DR. JIM KENDALL: That's -- as you were speaking today, Howard, that in October it's usually frozen. In November it's not this time.

MR. HOWARD PATKOTAK: It starts freezing up in October when I was growing up.

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MR. JOSEPH AHMAOGAK: Yeah. This weather right now today, it's just crazy. I mean, we are 30 above, and New York has got six feet of snow, right?

DR. JIM KENDALL: They stole it from us.

MR. JOSEPH AHMAOGAK: Yes. It was raining last week. I'm sure you guys probably saw the rain coming up from Kotzebue and Point Hope. So I thank you all very much for the time to comment, but I've got to go back to work. And we hope the weather works with you all to get to all the other communities and get the input from them because I'm sure they will -- with this short notice on the scheduling of public testimony for the communities, I'm sure, just like me, they didn't have much time to prepare a statement for the SEIS.

DR. JIM KENDALL: Please use the website. And thank you for acknowledging and telling us to keep on the schedule.

MR. JOSEPH AHMAOGAK: Yeah. Thank you all.

DR. JIM KENDALL: Anyone else? Our circle is getting lonely.

MR. HOWARD PATKOTAK: Before I leave -- Howard Patkotak with the tribal council. [Speaking in Inupiat.] This area [indicating] is only about 40 miles from Wainwright. Any kind of comment that you want to put

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on the record you could. [Speaking in Inupiat.] When they are looking for oil, that's exploration. They want to hear your comment for the record. [Speaking in Inupiat.] How you say -- they'll watch what the oil companies are doing. [Speaking in Inupiat.] Only about 40 miles. What I want from the tribe's side is I know it's one exploration, but I want zero discharge policy put in place because we are right at ground zero with that stuff happening out there, plus our little fish, our whales, seals [Speaking in Inupiat.] in the water, I want those protected. [Speaking in Inupiat.] From our tribal side, I want our rivers, our streams, our creeks protected from that oil spill. [Speaking in Inupiat.] The current --

MR. FREDERICK KAGAK: So he's saying if they have an oil spill out here, it's going to come straight to our area out here.

MR. HOWARD PATKOTAK: It will come directly to our coastline if an oil spill actually happens. This is only if an oil spill happens. I'm not saying there is going to be one, but I'm just saying for the record that I want the federal government to put in stipulations that we have zero discharge when they are exploring out there.

Not only that, we have [Speaking in Inupiat.]

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2-, 300 miles away [Speaking in Inupiat.] every year they travel through the Bering Strait past Little Diomede Island all the way to the Russian coast, 2-, 300 tankers, 2-, 300 miles out [Speaking in Inupiat.] from all different countries, China, Russia, might be Thailand [Speaking in Inupiat.]. I see -- what was the coal? [Speaking in Inupiat.] Their trash, I don't want that. I want them -- I want the federal government to pressure the private companies, commercial companies, international companies that have shipping out there, make sure they have zero discharge policy. Get that written up. Enforce the air and water pollution standards out there because they already -- they already traveling through the ice-free area already. [Speaking in Inupiat.].

This is what I want from the tribe's side is I want stringent anti-air pollution and water pollution standards placed on those private companies, either here in the United States domestically or the foreign companies. Make that known. You have a platform to do that. That's what I want from the tribe is more -- zero discharge policy when they are looking for oil.

I don't want them dumping crap out in the ocean. That's where we get our seals, our whales. Polar bears swim out there. We have walrus coming in at Point Lay. They have nothing to land on and rest. Although one funny

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thing we thought of when I was at OC board was why not some floating islands we could put out in front of Wainwright so the walrus can have a chance to rest up instead of swimming all the way out and swimming all the way back with no ice to rest on.

That's what I want from Wainwright's side, community's side because I want my fish to be protected. I want my seals, walrus, polar bear, whales. They have to go 30 miles, 35 miles north of us just from the coastline springtime and also fall whaling just to get whales, sometimes pretty near 40 miles. That's a long way. Whereas we used to just go 20 miles up the coast and only a mile or two, and then we would be ale to go whaling. Now they have to leave the first year ice by boat and go actually out in the ocean and go looking for the whales. And out there they have pretty large swells when you go further out, and it's kind of dangerous for these small 18-foot aluminum boats that they use. Some even use 20-footers, but still you have large waves. You know, that's a big risk for our community members here.

I just went -- I didn't have a chance to give my comments last time because I was not in the tribe, but now that I'm in the tribe, I want my comments made.

Make sure you hold the oil companies accountable. Not only that, but all those shipping

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companies.
Also another thing. What about the Coast Guard? I was thinking search and rescue. Why not pressure the oil companies to donate to the village of Wainwright search and rescue? Local search and rescue, you know, they survive on small donations. A lot of times they don't even have the money to fix their boats and equipment. They are very dependent on handout from the Borough or small donations from the corporations or even from ASRC. I'd like to see -- because we have all heard the oil companies, you know, if they have a program that supposedly benefits the communities, whether they are with the schools, medical facilities, that sort of thing. I'd like to see that happen in Wainwright because we know they are going out there. If they want that oil, contribute to Wainwright.
We have hardly any money in town, hardly any jobs. It's bad. Not only that, our food, it's getting harder and harder to hunt on land and even on sea. It's ice free. It's rough, too. We take a big risk going out like that. I'd like to see the oil companies put up and shut up, you know. It's not a handout. We sure need the money down in Wainwright. That's what I'm asking for. It won't come from -- out of thin air.
If the oil companies want that oil and gas, make

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sure Wainwright gets the benefit. We need the jobs. We need to keep our schools running, our clinics running, our homes heated. We need that. Otherwise we go back to the Stone Age and start getting coal up the river or down the coast. I don't want to go back to that life. Nobody in his right mind would want to do that. But I still want to hold the oil companies up to their standards. Make sure you up the standards because oil companies -- we all know over the past decades, different countries, we hear they are really dirty. They pollute. They don't really care.
So this is our chance at Wainwright to make sure our voice is heard. Make sure your comments are put on the record because they are going to look at that and make their decision on how the oil companies are going to behave out there. Don't be shy. Get in a chair and speak your piece.
DR. JIM KENDALL: Very well said. Very well said. Thank you. That's what we -- that's what we need to hear.
MR. HOWARD PATKOTAK: I'll probably remember some more, but I think I got most of it.
DR. JIM KENDALL: In your meeting in your office we did discuss that next year in May the United States becomes the chair of the Arctic Council. We are working with some of those folks. And many of the tribes

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around the Arctic Circle have similar concerns. So what you are saying is gathering a lot of momentum. And we will make sure that the people that I work with that work with the Arctic Council hear what you said. Those are good wise words.
MR. HOWARD PATKOTAK: I don't want to make you feel unwelcome in Wainwright. We all know you are just workers, just like we have workers here. But you do represent a platform where a community can get their voice heard, and I'm glad I'm able to open my big mouth.
DR. JIM KENDALL: We do not feel unwelcome. We feel very welcome. What feels unwelcome is when no one will speak to us. We feel very welcome.
MR. HOWARD PATKOTAK: I don't think I got anything more.
MR. ROSSMAN PEETOOK: Turning the operation, what about the oil rigs in danger by icebergs, heavy icebergs or the heavy winds?
DR. JIM KENDALL: What would they do?
MR. ROSSMAN PEETOOK: In case the heavy winds came in or heavy ice came in, if one of the rigs break off, are they able to tap it off right away --
DR. JIM KENDALL: Yes. That's part of the deal. Like last time --
MR. ROSSMAN PEETOOK: -- before it start

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flowing?
DR. JIM KENDALL: That's why in 2012 when Shell was drilling up here, they were not allowed to go into the oil-bearing zone because part of the responsibility was that they had to have a capping and containment system that they had to make at the last minute for the Gulf of Mexico for Deepwater Horizon. Well, they had to have that made in advance before they could get in the oil-bearing zone. They made it, and when they tested it, ir didn't work. So we said huh-uh. You could drill a little bit, but you can't get into the oil. And so that's a caution there.
They also have to -- like in the Chukchi, have a well cellar where the blowout preventer is beneath the surface of the bottom so that if they had to leave in a hurry, they turn it off, pull the pipe up and then the ice can go over top. Now, my engineer is sitting over there. Now, Betty, did I describe that correctly?
MS. BETTY LAU: You got it exactly right.
DR. JIM KENDALL: So those are the kinds of things that we would make them do. And then our other organization, the Bureau of Safety and Environmental Enforcement, they are the cops. They fly in on helicopters. They have uniforms. And if they don't do it right, they either get fined or they close them down.

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MR. ROSSMAN PEETOOK: And they got the technology to clean it up, too, don't they?

DR. JIM KENDALL: They have some technology, but the best way to clean up oil is not to have it released. So we all know that cleaning up any oil spill is going to be very difficult, and it's going to be extremely difficult in the ice.

So like last time, if they would have gotten into the oil zone, if they were allowed to -- which they were not -- we predicted, working with our friends at the weather service, that ice was predicted to form on November 1st in 2012. They told us it would take 38 days to drill a relief well and clean up their mess. So we say, okay, if it takes that long and you can't do it in ice, and we say ice is going to be there November 1st, you have to be out of the oil zone 38 days before that. You know, we are not taking chances. That was the law. But because they didn't have the capping and the containment system ready, they weren't even allowed to do that.

So let's just say, Howard, that sometimes the oil and gas companies are not as welcoming as you because we don't work for the oil and gas companies. We have to protect the environment and the communities and make sure everyone gets treated fairly.

MR. HOWARD PATKOTAK: I know I mentioned

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the if and when that new administration changes at the presidential level. We just want to make sure that we still have that open seat at the table with the community because we all know that we are right -- we are right at ground zero. Forty miles is nothing to Wainwright. That is close, close as this chair right here.

Feel free to comment. This is your -- this is your community. If you care about your community, you will speak up. You can ask questions [Speaking in Inupiat.] because they have got the laws to use against the oil companies [Speaking in Inupiat.] using their power.

MS. PAULETTE PONICK: My name is Paulette Ponick, and I would like to make a comment because my heart has been moved by what you have just said. I'm a visitor in your community. I'm a guest. And I have been given the responsibility of teaching the children. But the children are teaching me where these leases are concerned because they ask me questions. And two questions they have asked me caused me to come here tonight.

The first one was that they had heard in the news that if there were to be a spill 40 miles offshore, that oil dispersants would solve the problem. And they look to me to tell them if this is true or not true. And

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I'm not a scientist or an engineer. I'm an English teacher. But when I read what you have written, what it says to me is that the dispersants are still under investigation because they are toxic and they are biotoxic, meaning they will affect the food that is given by the ocean.

And the kids are very concerned about this because when we talk 77 years, we are talking not only their futures, but their children's futures.

The second thing they are very concerned about is in section 4.6, what is called unavoidable adverse effects. And this is on page 565. And I'll just quote them and read them because they are so powerful the way they have been written in the report. "Sociocultural systems. Adverse effects to subsistence harvest patterns, cultural perceptions of increased oil and gas activity, and increased population infrastructure and revenue associated with oil and gas development."

And basically what my students say to me is that means our lives are going to change forever. When we have a 1,000-man camp at the DEW line, what will that mean to us? Where will they hunt? Where will they come for fun, and who will they date? They are concerned. These are teenagers, but they are smart teenagers.

The second thing is public health. "Population

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influx influencing communicable disease patterns, increasing social stressors and tensions, and contributing to possible increases in mental health substance abuse issues."

My students have come to the oil presentations here. They get a hot dog and they get a backpack, but they want answers. And they are looking to the traditional Elders here to give them the answers. And I would love to see more educational materials like this that I could take to the kids. I'll teach them how to read it, but you have to give me the stuff for them to read.

DR. JIM KENDALL: How many of those would you like?

MS. PAULETTE PONICK: I'm quite serious with you. You give me a set of 14, I will use them in my classroom, and I will encourage my peers to take them.

DR. JIM KENDALL: Write it down. And we can add to that, is one thing we have been trying to do -- and we are open to this -- our science program, we don't get all the science from all the other agencies all the time. We also do our own. We have spent 450 million dollars. We have some science folks -- and I used to run the science program -- that would love to come up here, and whenever you say, give a lecture on this is what some

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of our reports say. Beautiful PowerPoint presentations on the science, how they use it, whether it's about whales or physical oceanography or what we think we have learned about traditional knowledge. Tell us if we are wrong. We'd love to do that. We just don't want to be a burden to the community and show up and say, what are you here for. You tell us when you would like us to -- make sure the boss agrees, and we will be happy to send people and provide anything you would like.

MS. PAULETTE PONICK: Well, the community needs to help us because, again, Shell is very much interested in our school and they give us stuff, but they don't give the kids answers, and they want to hear answers from people they trust. How can they trust me? I'm an outsider. They barely know me even, though I was here eight years ago. But they listen with their hearts to you. And so this is my plea is if we have materials, you help introduce the outsiders to come in and speak to the kids. They will listen. But they are very, very, very concerned about the impacts on their lives. Thank you.

MR. HOWARD PATKOTAK: You make a good point about our future generation. One thing I find all over the place, not only Wainwright, but the rest of the communities, you know, we don't get to hear from up and coming future generations. Yes, they are small. Yes,

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they are growing up. But at least some kind of communication so they kind of get an idea of what's going on. They have a sense of -- what's the word for a sense of participation in what happens in the community?

MS. PAULETTE PONICK: Engagement, being part of it.

MR. HOWARD PATKOTAK: One of the things that -- I've heard this over and over is why not invite the younger generation when we have our public meetings. Do it by e-mail. You have a principal up there at the school, at the North Slope Borough School District, those kind of things. Have them participate and become contributing members of our community.

When I was a small boy, I'd like to share a little bit about that. I watched the changes like Rossman described about what's been going on in Wainwright for the past 30 years, 40 years. It has really changed. Our ocean is not the same anymore. Ice is not as thick as before. We don't have as many fish. Even our caribou population is going down only because of its natural cycle.

But to hear climate change, I don't believe in climate change from the studies way, way back even before when we were -- even before we were born, these scientists kept track of the earth age, and they found out that earth

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has a natural heating and cooling cycle. So we all -- we will always have ice diminishing and then ice forming even before we are long gone. But right now it's been imparted to subsistence. We still use our traditional ways of hunting, but it's a challenge. It's more of a risk on our side every time we go out. Ice is thin. Ocean is rougher.

Like he described, whales, they have to look for a natural area along the coast where they can get a whale to try to find a way to bring that whale carcass up. Most of the time it's first-year ice and when breakup time happens usually right north of the village, whereas a long time ago we used to have ice that's anywhere from, what, 15 to --

MR. FREDERICK KAGAK: Just like ten years ago -- just about ten years ago, from my remembrance, we used to drill holes for the block and tackle all the way down. Nowadays we drill holes and we reach the bottom of the ice and water comes out just from ten years' timeline.

MR. HOWARD PATKOTAK: This stuff was happening even before I was born. It was already doing that. Because every year is not the same, but over these past ten years, the ice had really rapidly gotten thin. It's a risky business for us to go hunting on the ocean or out in our rivers.

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MR. FREDERICK KAGAK: With the gas prices, too.

MR. HOWARD PATKOTAK: So much thick, whereas it used to be so much thicker than that in the past. So it's definitely impacting our way of -- subsistence way of life.

MS. PAULETTE PONICK: I want to reassure you that when I got the -- the invitation, I invited my students. And not only did I invite them, I told them I would give them lots and lots of extra credit to be here, but they are shy. You know that. And the more we all include them in this, the more you get to know them as people, the easier the future will be here because they are your young leaders coming up.

MR. HOWARD PATKOTAK: We have to -- plus as parents you got to communicate through your kids, talk to your kids about what's happening. Don't just be saying don't do this, don't do that. You tell them what's going on. Don't try to tell them, I want you to think this way, I want you to think this way. No. You need to tell them what's going on. That way their minds are not so screwed up. Right now our young people, I notice they're having mental problems because they can't deal with what's going on today.

Well, even possible oil development. It's

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creating a stress in their minds. You know, Western society wants us to work. Our Native lifestyle being Natives. We have those two forces going against each other. Should I go hunting or should I go to school? That kind of stress is going on in their young people's minds. It's -- it's hard to describe. But some of our young people are in that situation.

Me, I'm not in that situation because I respect myself. I'm an Inupiat. I'm not any other race. I don't have that problem where I'm fighting Western ideas with Inupiat living because I recognize who I am. I am Howard Patkotak, Inupiat. So I don't have a problem with mental issues or this possible oil development because I know all across the North Slope, all our villages depend on diesel fuel, motor oil, snowmachines, outboards, trucks, gasoline. We all -- we all need those things up here. Without it, you wouldn't have no lights. You wouldn't have no school. You wouldn't have no chairs to sit on. And possibly these guys would never be here talking with us.

DR. JIM KENDALL: Well, let me throw an idea on the table. And this may impact our schoolteacher visiting. That we come up to a village like this and we meet and have a government-to-government meeting and then we have the open, you know, public forum. But in regards

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to your future leaders, how would it be received if, let's say, we got here a little bit earlier and with a select group of students we made this presentation to the group of teachers -- or to the group of students and said think about this while you are walking home from school and you are having dinner, and then invite them to come to the meeting after they have heard us speak at the school and realize we are normal folks. Would that help? Would they say, wait a minute, I met them, they are okay? And we say we are going to have cookies there. And then --

MR. HOWARD PATKOTAK: That's where I disagree. I don't want government to come down and teach our young children. That's our job as parents. So I don't like someone coming and telling me what to do. We can do it ourselves. We can communicate that to our children.

DR. JIM KENDALL: Good.

MR. HOWARD PATKOTAK: Not -- not tell them you got to be -- you got to pose this because of that. You got to teach them what's really happening out there. That's the real truth. If they know the truth, they're going to have a much easier time dealing with it. If they don't know, it creates lots of question marks in their heads, and pretty soon they are -- they are scared. They have fear.

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Fear is nothing but an emotion without any facts behind it. It's just fear. It's being scared. That doesn't help nobody make a decision. Nobody should make their decision out of fear because you are so caught up in fear that you can't make the right direction -- right decision. So I would knock that fear out of my mind, out of my children's mind. That way they are clear on what kind of decisions to make. So I don't agree with people saying government got to do this. Government -- no way. That is my right. I'm going to protect that right. I'm going to speak up. I don't care if you shot me down. I'm going to teach them myself.

DR. JIM KENDALL: Good.

MR. HOWARD PATKOTAK: I don't agree with government or the school district teaching my kids this is what's going on. No. I'm going to be the one because they trust me. They don't trust anybody else. That's how little kids are brought up. You all have -- you all have probably children. I don't believe you tell them, hey, you can go talk to this stranger so and so and you let them be. No. This is my job as a parent. I'm going to tell them what's going on. I don't want government or somebody telling my kids what to think, what's out there. I'm going to be the one doing it. I'm not going to be dependent on somebody when I can be independent. I am

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independent. That's how I was raised, thanks to my father and mother.

Plus I'm also a member of the community, and I'm glad I got the opportunity as a tribal member to speak for Wainwright because Wainwright is dear to my heart. I love the hunting. I love the people. There is no other place like Wainwright. Only Wainwright -- it's one unique place. That's why I have been here most of my life. I came back after school to come work here and contribute back to the community. And it's the way I'm giving it back.

And if I can give my voice to further protect our community and make sure these guidelines are set in place, that way when I'm gone, at least these guidelines will help steer oil companies on what not to do out there. Make sure those oil companies do it right. Make sure we have a voice in what's going on out there and make sure you get those stipulations in that lease.

I know the tribe missed their chance back in 2008, but we want to make sure those comments are put in the record. We want no discharge in the oil exploration, even development. I know you explained that there is different stages of development from oil exploration to --

DR. JIM KENDALL: To development to production to decommissioning.

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MR. HOWARD PATKOTAK: And each has its own --

DR. JIM KENDALL: Environmental studies and review and public input.

MR. HOWARD PATKOTAK: Yeah. Okay. That's what I understand.

DR. JIM KENDALL: Right.

MR. HOWARD PATKOTAK: But for oil exploration for now, our tribe wants no discharge on their oil exploration during this five-year lease. Or you said ten years, right?

DR. JIM KENDALL: Well, the leases, they have at the very beginning ten years to do something, like to start the exploration. This is kind of different because of what -- the courts and the litigation that has stopped us off and on, it's kind of been extended because of the suspension of operations. But if they don't do anything, even with this extension, eventually the leases expire. But if they do something and they explore and they decide to go on, then they have to give us a development plan. And we have to do another EIS, and we come back and we show it to you and you tell us what you think. It doesn't happen overnight. It takes several years of meetings and documents to -- so everybody knows what's going on.

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MR. HOWARD PATKOTAK: Even with oil exploration we still have, you know, some garbage or waste oil dumped into the ocean while we don't see because we can't see them in our coastline out here. Even though they are 40 miles out, we know -- when they are not looking -- when nobody is looking, the oil companies will drop something into the ocean. I don't want that happening. That's why I said zero discharge policy.

DR. JIM KENDALL: Well, the only thing, that kind of enforcement falls under another bureau, BSEE, Bureau of Safety and Environmental Enforcement. But I can tell you -- and I cannot speak for BSEE -- but when there was drilling in 2012, BSEE had an inspector on the platform 24/7, unlike the Gulf of Mexico where they fly around and every so often stop. Up here is recognizably different. So when they explore, BSEE will have an inspector on the platform. And if they do something like that, that's it. They stop. They are busted.

MR. HOWARD PATKOTAK: So the stipulations are already in place in that lease right now where -- that thing you are talking about where they put someone on the --

DR. JIM KENDALL: That was a condition of the application to permit to drill. And that's a different organization. They work with us. But when we

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were MMS, there was a concern and a perception that one group of folks was telling another group of folks what to do, so they broke us apart. We are the landlord. We manage the land. BSEE, they are the cops. So after we approve a lease and approve an exploration plan, when the drilling rig comes up, BSEE takes over and says, this is what you are allowed to do, this is what you are not allowed to do according to the lease and the exploration plan, and I'm going to stay with you and make sure you do it.

MR. HOWARD PATKOTAK: But for the meantime, I just want that on the record because that's the view of our traditional council is we don't want that stuff being dumped in the ocean.

DR. JIM KENDALL: Good.

MR. HOWARD PATKOTAK: You got that, right? I think I've used up most of my comments.

DR. JIM KENDALL: But they are good comments.

MR. HOWARD PATKOTAK: Yeah, because we are talking about something so huge and something so close to Wainwright, I can't just keep my mouth shut about it. So although I agree with the young teacher here about teaching students, it's the parents' job to make sure what they learn. It's your job to teach them English and math

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and whatnot, but it's our job to teach them Inupiat way of life --

MS. PAULETTE PONICK: Absolutely.

MR. HOWARD PATKOTAK: -- although most of the school district does that on their own, but to me virtually my kids trust me more than anybody else, you know. That's how I know each of you are, too.

MS. PAULETTE PONICK: And I know that, which is why it's so good that you are here and you are interested in doing that because without you they will not get the relationship and get the respect to ask the questions. You need that.

MR. HOWARD PATKOTAK: I just remembered something. This is for the record. We also oppose using -- what the heck do they call it?

MS. PAULETTE PONICK: Dispersants.

MR. HOWARD PATKOTAK: Dispersants. We don't know what's in there. At least I don't want that being put out there if there is an oil spill. I don't want them using that stuff out there because I don't know what that is, not knowing what it is, how it's made, how it might be extremely harmful to our marine mammals out there. So I oppose that from the tribe's side.

MR. FREDERICK KAGAK: And it will get into our lagoon up here because the current from out here, it

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does go up inside there and will get into our fish and everything.

MR. HOWARD PATKOTAK: Thank you for coming. I got to go home.

MR. ROSSMAN PEETOOK: I think we should work together.

DR. JIM KENDALL: Yes.

MR. FREDERICK KAGAK: Do you know how much oil is under our ocean right now?

MR. ROSSMAN PEETOOK: Our villages are opposing developing on the ocean, but we can work together somehow. We don't know much, but we may know something that you don't know.

DR. JIM KENDALL: You know a lot that we don't know.

MS. SHARON WARREN: You had a question, right?

MR. FREDERICK KAGAK: Yeah. How many gallons approximately is under our ocean right now?

DR. JIM KENDALL: Okay. If you are talking about the Chukchi --

MR. FREDERICK KAGAK: Yeah.

DR. JIM KENDALL: That's where the numbers are kind of hard, but if you look at that lease sale, just that one lease sale with those leases, Mike estimated --

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or Betty and her team of geologists estimated that with an anchor field and then extra smaller field there would be about --

MR. MIKE ROUTHIER: 4.3 billion barrels.

MR. FREDERICK KAGAK: And if they do start drilling and if they struck oil and if they had an oil spill, how much of an area will it cover?

DR. JIM KENDALL: That is described in the document, right?

MR. MIKE ROUTHIER: Right.

DR. JIM KENDALL: It's in the document. And what we learned from Deepwater Horizon, since that was really a huge spill, we looked -- the geologists looked at what they think is there. And if something similar would happen, the numbers would not be the same, but they estimate it and they call it a very large oil spill. And that is in the document, as well as two other spills. Proposed. Not that they are going to happen, but if it did happen, we need to analyze it in advance. So that's in the document. That's all laid out for you.

MR. MIKE ROUTHIER: One important thing to remember is that although we can get some very smart people making estimates based on very good data, they never really know whether what they think could be there is actually there until they drill that exploration well.

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That's why those would be necessary to confirm whether there is actually oil in there or not. So there might not be anything.

MR. FREDERICK KAGAK: How much of the coast will it cover, all the oil? How much of the coast will it cover?

DR. JIM KENDALL: It depends on the winds, the currents and the time of year and whether they do the oil spill risk assessment, the OSRA, which is discussed in the document; it would show where the oil went. So that's in there, right, Mike?

MR. MIKE ROUTHIER: We provide likelihoods of contact for different areas. So our scientists tell us what areas are important, and that's where people in the community can help us is letting us know what areas are important to the animals, important as hunting grounds. And we conduct modeling based on ocean currents and wind data, and we calculate the likelihood of oil spilling from one spot contacting these important areas, and that's what is provided in the document is probabilities, likelihood of contacting areas.

DR. JIM KENDALL: So if you remember from Deepwater Horizon, that tragedy when that oil was leaking, they were using satellites to watch the oil. We knew the currents and the wind, and using the models they had a

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pretty good idea of where it was going. Some people said it was going to go to England, up through the Gulf Stream, and none of the modeling showed that. So they knew by studying the currents and the winds and using the models they could position the cleanup equipment where it needed to be.

MR. FREDERICK KAGAK: All right.

DR. JIM KENDALL: It's science and art. But it's not perfect.

MR. FREDERICK KAGAK: All right. That's all.

DR. JIM KENDALL: This was a very good meeting. This is what we need. If there is no other questions or comments --

MR. FREDERICK KAGAK: Will you guys be here again anytime soon?

DR. JIM KENDALL: There is two more times we are coming up. Even though this is for this process and we have got to finish it by the court date, we are also planning for the next five-year program, which would go from 2017 to 2022. And it takes three years to plan that. You will see me again and maybe -- and Mike and maybe some people from headquarters probably in January. And then we have some new Arctic standards coming out that we are doing with that other agency, BSEE,

to tell the oil companies this is not only what we are going to make you do, but now it's the law. They are going to come out sometime, we hope, before January 1st. And you will see us again, and we are going to ask you what you think of those. Not such a thick document, but that's where we need folks who are experts up here like yourself and your Elders to look at it and tell us, yes, that makes sense or no, it doesn't make sense. So you will see us again.

MS. SHARON WARREN: And if you want copies of some of these documents that come out, we do post them on our website, but if you actually want copies of it ahead of time in the mail, if you give us your name and your address, we will mail them to you so that you can be on our mailing list, and we will mail the documents to you.

DR. JIM KENDALL: Any other comments before we close the day out? This has been one of the best meetings we have had. With that, thank you very much for coming. This has been a great meeting. We will not be strangers. And we hope that we don't bother you too much. Thank you.

(Proceedings adjourned at 8:57 p.m.)

REPORTER'S CERTIFICATE

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IN WITNESS WHEREOF, I have hereunto subscribed my hand and affixed my seal this _____ day of December 2014.

_____
MARY A. VAVRIK,
Registered Merit Reporter
Notary Public for Alaska

My Commission Expires: November 5, 2016

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PUBLIC HEARING
FOR
193 REMAND - CHUKCHI SEA

BUREAU OF OCEAN ENERGY MANAGEMENT

Anchorage, Alaska

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BE IT KNOWN that the aforementioned proceedings were taken at the time and place duly noted on the title page, before Mary A. Vavrik, Registered Merit Reporter and Notary Public within and for the State of Alaska.

P-R-O-C-E-E-D-I-N-G-S

DR. JIM KENDALL: All right. I think it's a good time to start. There may be a couple other folks that are signing in, but looks like we have got a great crowd anyway. Thank you all for coming this evening. This is a very important meeting. Please be careful with the weather. This is something that's a concern for everybody. Okay.

Now, who am I? My name is Jim Kendall. I'm the Regional Director -- can you hear?

AUDIENCE: We can barely hear you.

DR. JIM KENDALL: I will just hold it like this so you can hear me. How is that? Give me the thumbs up. Okay. My name is Jim Kendall. I'm the Regional Director for the Bureau of Ocean Energy Management. Now, BOEM, B-O-E-M, is a federal agency, a bureau within the Department of the Interior. What we are here for tonight is to discuss the draft second supplemental EIS, and that's about all I'm going to say for it at this particular time because we are going to have a presentation on it to tell you exactly why we are doing this, how we put it together, and where we are in the process.

Before I go any further, I want to introduce our team. So the BOEM people, please stand up and introduce

yourselves, starting.

MS. BETTY LAU: I'm Betty Lau. I'm the Chief of Resource and Economic Analysis section for BOEM.

MR. MIKE ROUTHIER: Mike Routhier. I'm the project manager for the document.

MS. SHARON WARREN: I'm Sharon Warren. I'm the Deputy Regional Director.

MR. MICHAEL HALLER: Michael Haller. I'm the tribal and community liaison.

MS. LISA TOUSSAINT: Lisa Toussaint, regional supervisor for office of environment.

MS. LIZ GOBESKI: Liz Gobeski, Solicitor's Office, Department of the Interior.

DR. JIM KENDALL: Is there anybody else from BOEM in the room?

MS. SHARON WARREN: No. They are outside.

DR. JIM KENDALL: Also one person who was not introduced because she technically doesn't work for us is Mary Vavrik sitting right over there. Aside from you all who are going to provide some good comments, she is the second most important person in the room. She's our court reporter. And she takes down everything that's said. So if you choose to come up and make a statement, please talk clearly, enunciate and, again, give us your name so she can get that into the record.

Now, as for the process, we are going to start off with a PowerPoint presentation on what this is all about and how we are doing it. Then we will start a comment period. We are going to do that by lottery. For those of you that have decided that you want to speak, okay, you wrote your name on a piece of paper. It's going to be in a little bucket, and we are going to pick out the names, and that will tell the order we are speaking. If you didn't put your name in the little container and you change your mind, you are welcome to go back outside, fill out a little card and we will put it in.

We would also like to limit comments at the beginning to about three minutes. We want to make sure everybody has a chance to speak. Now, if there is time at the end, we can go back and we can ask for more comments. All right? But we have to vacate the room by 10:00. So we are going to wrap this up about 9:45. If you brought anything with you in terms of handouts, you have some speaking notes, it would really help us have a better record if you could provide those to Mary. We want to make sure that we get everything that's said into the record so we can use that for our document.

Before I turn it over to our speakers going through the presentation, this is really important. The document we are talking about tonight is not a decision

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document. It is a document that pulls information together. That document, this informational document, will be given to the decisionmaker. The decisionmaker is the Secretary of the Interior. So our goal is to provide the Secretary with all the information we can gather and analyze so she can go through it and eventually make a decision. So that's why we are here tonight. Sort of the CliffsNotes version.

And with that I'm going to turn it over to Mike Routhier and Betty who are going to walk you through what this is all about. So Mike.

MR. MIKE ROUTHIER: As Jim explained, we're here to talk about a document that the agency has produced. It's a draft document. And we are here to get your comments on that document. This document is called Chukchi Sea OCS Oil and Gas Lease Sale 193 Draft Second SEIS. And SEIS stands for Supplemental Environmental Impact Statement. That's a NEPA document. It's a document that analyzes environmental effects of a potential decision.

We are the Bureau of Ocean Energy Management, or BOEM. It's a federal agency within the Department of the Interior. We are here to talk about that document we prepared and get your comments on that document.

First a little background information about what

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BOEM does. The primary responsibility of BOEM is to manage the development of offshore energy and mineral resources on the Outer Continental Shelf. In Alaska, the Outer Continental Shelf, or OCS, is three miles to 200 miles from shore. And the agency is tasked to do that in an environmentally and economically responsible way.

The program that the agency runs starts out with a five-year program that assesses at a national level which areas of the OCS might be suitable for leasing. Once leases are sold, then companies might submit exploration plans or development and production plans. The agency's responsibilities includes reviewing and potentially improving those plans. Prior to any approval, the agency conducts many environmental reviews. Those reviews are supported by a robust environmental studies program. And the agency also does other things like evaluate the offshore resources of various areas; in other words, how much oil and gas might exist in certain areas of the OCS.

This program I described takes place in a four-stage process. First was that five-year plan or five-year program that I mentioned. Second would be planning for a specific oil and gas lease sale. Where leases are sold you might get to the EP stage, and if a company moves past that, you might get to the development

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and production plan phase. Here it's important to remember that we are still at stage two of the process, the planning for the specific oil and gas sale stage. And it's a little bit different here in that we are analyzing a lease sale that has already occurred, and so we will provide a little bit more background information about Lease Sale 193.

This process started back in 2007. The agency was contemplating holding a lease sale and, according to NEPA, prepared an EIS, or Environmental Impact Statement, to analyze the potential effects of leasing in the Chukchi Sea.

In 2008 Lease Sale 193 was held, collected high bids of almost 2.7 billion and leased 487 leases. In 2010 and 2011 the agency prepared a supplemental EIS. And this responded to a United States District Court remand. After BOEM went through the process, conducted more environmental analysis consistent with that remand, the agency went back to the District Court who then found that the agency had satisfied its responsibilities, and it dismissed the case. However, the plaintiffs in that case appealed to the Ninth Circuit Court of Appeals.

That appeal raised two main issues. The first issue was an issue concerning missing information and how the agency had handled that issue of missing information

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in the 2007 document. And the Court of Appeals dismissed that argument. However, the second issue the Court of Appeals did not dismiss. That was an issue concerning the scenario upon which the 2007 document was predicated.

The 2007 SEIS analyzed a one-billion-barrel exploration and development scenario. And the idea was that the one billion barrels represented the minimum field size to justify development in Chukchi Sea which is a frontier area with no prior economic discoveries.

The Ninth Circuit Court of Appeals found that the reliance on a one-billion-barrel scenario was a deficiency. Specifically the agency had acknowledged that if that first field were to go in, that field of one billion barrels or more, then more development and production could follow. However, the agency did not analyze the environmental effects associated with any subsequent development. And that was found to be wrong by the Court of Appeals.

So now BOEM is correcting that deficiency by preparing this Second SEIS, and this document analyzes the environmental effects associated with a higher level of production, specifically 4.3 billion barrels of oil and 2.2 trillion cubic feet of natural gas production.

When we set about developing this document, we understood that it would be important to bring in other

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parties with knowledge of the environment and expertise in the issues that we were evaluating. So basically we invited several agencies to be cooperating agencies; in other words, help us with the document. Several agencies accepted that invitation. Those include our sister agency, the Bureau of Safety and Environmental Enforcement, or BSEE; also the Bureau of Land Management, BLM; the State of Alaska; the North Slope Borough and the Northwest Arctic Borough. They are all cooperating agencies. There are also several participating agencies, other agencies that are also helping us prepare this document. Those include EPA, Fish & Wildlife Service, NMFS, and the Coast Guard.

As a NEPA document, the heart of this document is in the alternatives analysis, and this Second SEIS analyzes four alternatives, and the same alternatives that were analyzed in the 2007 document and also in the 2011 supplemental document. Basically they go to a decision of whether to affirm the leases, to modify the lease sale in some manner, or to vacate the leases that currently exist in the Chukchi Sea. And it should be noted, that's a decision that falls to the Secretary of the Interior.

Another critical point here is that no new areas will be leased through this process. So the document doesn't analyze leasing anywhere else except for those

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areas which are currently under lease.

So the foundation of any environmental analysis is the scenario. You need something for the environmental analysts to analyze. And this was especially critical here because the Ninth Circuit opinion found fault with some issues loosely pertaining to the scenario in the previous document. So here to talk to you a little bit more about how BOEM developed that scenario is Betty.

MS. BETTY LAU: Thanks, Mike. Okay. One of the concepts that's difficult for everyone to get a handle on is that the Chukchi Sea is associated with a lot of different numbers. And in order to do this analysis, the Court told us that we had not analyzed a sufficient volume. So we had to go back and start from the beginning and reanalyze it now with the basis of the new information that we had from the actual lease sale. So instead of some nebulous area that was being offered for leasing, which is the way the analysis was done before the lease sale, now we know what was leased, we have new information, so we took a fresh look and we started over.

But if you look at all of the Chukchi Sea planning area and you look at all the potential prospects or places that might have oil and gas, there are about 8,500 of them. And that's based on the knowledge that we do have, plus extending that statistically to include

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areas where we don't have information.

From that area, now, as we move down the triangle, we talk about the UTRR, the undiscovered technically recoverable resource. That means, again, we don't know for certain where they are, but we think that this is the pools that would be available to us using our current technology. So nothing exotic, just the technology we have at hand. Now, that drops our number from 8,500 prospects to 1,400 pools, or 15.4 billion barrels. But that's undiscovered. And it's technically recoverable if money is no object.

Well, money is an object, as we all know, and so we further reduced that by assigning a price and analyzing how much of that UTRR would be recoverable at a specified price. Obviously if you change the price, you change the UERR, or undiscovered economically recoverable resources. And at $110 a barrel, which is the price at which we analyzed it -- and although it looks a long time ago, that's really what it was last summer -- you get 11.5 billion barrels in the Chukchi Sea. You can see how this is going down and down.

Now, of those 11.5 billion barrels, that's for the entire area in the Chukchi Sea. Well, we are not talking about the entire area. We are not talking about adding any new leases as a result of this action. So now

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we have a limited area, and we also have a limited time. Leases are issued for typically ten years. Right now the leases in the Chukchi Sea are under suspension because of the litigation. But they don't have an infinite amount of time to develop them. And to get one big prospect developed would take time, and it would take a lot of resources. It would take capital. It would take new -- you know, working with new technology.

So when you talk about what could be developed as a result of Sale 193 and subsequent development from additional lease sales because you had a success resulting from Sale 193, you get 6.4 billion barrels. But then just the prospects that we think could be reasonably developed as a result of Sale 193, you finally get to the tip of the triangle, and that is 4.3 billion barrels with one big major field, what we call an anchor field, the one that holds everything down, the one that proves up your economics.

If you get one good, big field, you can -- that you are making money with, you may -- an operator, we are assuming, would explore and maybe develop one smaller field along with that anchor field that could use some of the infrastructure. They could use the pipelines. They could use some of the infrastructure that's already in place.

So that's where the 4.3 billion barrels comes from. As I said, it assumes the development of an anchor field, which is 2.9 billion barrels, and what we call the satellite fields, since it's relatively insignificant compared to the anchor field, of 1.4 billion barrels, which is still pretty big. And totaling 2.2 trillion cubic feet of natural gas.

Another big change in this scenario, which is kind of our idea of how you might -- how this 4.3 billion barrels might be developed -- and that's all it is; it's just our idea of how many wells would it take. How many platforms would it take? How much pipeline would you have to have? And that's the basis for the environmental analysis. One of the things we had to assume is that at present there is no way to get the natural gas to market. We make the assumption that the gas line going from the North Slope down to southern Alaska is going to be in, and by the time we are ready to sell our gas, it's going to be -- have -- it will have capacity.

But in the interim when you first produce out of the ground, you get oil and gas and water all mixed together. Our assumption is you would separate that out on the platform and pump the water -- and at first you pump the natural gas back into the reservoir to increase the reservoir pressure. It's the system they are using

right now at Prudhoe.

And what we do include is after the oil is depleted, then the natural gas would be produced at a later date, and that is the reason that from exploration through development and putting in your infrastructure, producing all the reserves -- first the oil, then the gas -- and also including decommissioning, so taking out the platforms, plugging the wells with cement, removing the infrastructure as it is no longer needed, it would take 77 years, which is considerably longer than any previous scenario.

We are assuming both oil and gas would be sent to market via pipelines; first a pipeline to shore and then across NPR-A to the North Slope either to go -- the oil would go into TAPS. The gas would go into the hopefully future gas line from the North Slope.

Okay. I'll give it back to Mike.

MR. MIKE ROUTHIER: So after Betty's group provided us with a scenario of this hypothetical set of activities to look at, we were then able to hand that off to our analysts, our biologists, our wildlife biologists, oceanographers, social scientists for the analysis of the potential effects. And that analysis considers new information, so we're talking about not only information regarding the leases as Betty mentioned, but also any new

scientific information that has come to light since 2011. We identify impact-producing factors or those aspects of oil and gas activities that have potential to affect the environment, and then we analyze the impacts of the scenario through time. So we walk the reader through the 77 years it would take to get through this hypothetical exploration and development scenario.

The analysis also looks at the potential for oil spills and makes many assumptions with respect to oil spills. More specifically, we assume that two large oil spills could occur, large being greater than or equal to 1,000 barrels. Using our historical data set, we have assumed figures of a 5,100 barrel spill from a platform and a 1,700 barrel spill from a pipeline. Our data tells us that something less than two large spills is more likely, but we wanted to err on the side of overestimating impacts for the purpose of this analysis.

Also with respect to oil spills, the analysis updates the analysis of the very large oil spill that was done in 2011, "very large" meaning greater than or equal to 150,000 barrels. It's a very unlikely event; however, knowing what kind of impacts could occur we felt it was important for the decisionmaker, the Secretary of the Interior, to be aware of the impacts that could occur in such an event.

The document also analyzes cumulative impacts. So we are not analyzing oil-and-gas-derived impacts in a vacuum; rather, we are also considering factors such as climate change, vessel traffic, additional development in communities, recreation, tourism, subsistence activities, military activities, any other activities not related to oil and gas activities, but which may also influence the overall impacts to environmental resources.

So what are the next steps in this process? Well, currently we are in a 45-day comment period that was triggered with the release of this draft document. And that comment period runs until December 22nd. Once all the comments are received, the agency will go through all the comments and revise the document accordingly, draft up responses to the substantive comments and in other manners just prepare the final version of this document. We expect to release a final version in late February of next year. And after a 30-day waiting period, then the Secretary of the Interior will be able to render her decision.

As far as submitting comments, there is two ways to do so. You can provide your comments here tonight through your testimony. And we have the court reporter here. Mary will take down your testimony that will be in the record that will be considered by the agency as we

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revise the document. Or you can submit your comments through regulations.gov. That is an on-line portal that the government uses to collect public comments. And as I said before, the comment period ends December 22nd, and it's actually 8:00 p.m. Alaska time. And you see the website provided here. We also have a handout that will walk you through how to use the regulations.gov portal.

And that concludes the presentation.

DR. JIM KENDALL: Thank you, Mike and Betty. This now officially starts the public comment period. We did that in just under 30 minutes since we started a minute or two late. And with that, I want to ask for the little basket that should be coming in any minute. Here it comes. No, not quite. But the basket, we're going to have people go in, pull the names out of the hat, so to speak. That will say the order people are welcome to come up and speak. Please limit your comments to three minutes or so so that everyone who has submitted their name has a chance to speak. We do have to be out of here by 10:00, so we have to wrap up about 9:45. And with the weather being as bad as it could get, we really would like to see people get home safe.

So with that, Sharon if you will find a couple folks to pick out some names, let's get started. We have a podium here. When you come up, even though I'll read

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your name, please go ahead and say it again. And if you have any materials you would like to pass out, that is great, too. My goodness. Number one on the list is Lois Epstein. Lois, you are number one. I'm going to put a one on that. And on deck is Ben Mohr.

MS. LOIS EPSTEIN: I wasn't expecting that. Well, thank you to BOEM for holding this public hearing, and I appreciate all your work on the -- the Draft Second Supplemental Environmental Impact Statement.

Good evening. My name is Lois Epstein. I'm an engineer and the Arctic Program Director for the Wilderness Society, or TWS. I've spent over 20 years working on oil and gas technical and policy issues as a consultant and as an employee of nonprofit organizations. I was a technical advisor on the report to the President delivered in May 2010 which contained recommendations on increasing offshore drilling safety following the BP tragedy, and I also served on the BSEE federal advisory committee established after the BP incident. I am not opposed to oil and gas production in Alaska. My role at TWS is to ensure that oil and gas drilling is done well and in appropriate locations.

The Wilderness Society was one of the plaintiff organizations which supported this reanalysis of the Lease Sale 193 production scenario and its impacts. The

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quadrupling of the production estimate in this Draft SEIS shows that there were significant problems with the previous analysis. TWS appreciates BOEM staff's hard work on this new document.

Since we testified before your predecessor, BOEMRE, on the Chukchi Sea Draft SEIS in 2011, our staff are more convinced than ever that drilling in the Chukchi Sea is highly premature and problematic. The mobilization and drilling related problems Shell experienced in 2012 should not be ignored by the Obama administration. Additionally, the Draft SEIS shows that there is a 75 percent chance of 1,000 or more barrel oil spill in the Arctic Ocean without the possibility of meaningful oil recovery, which provides together a powerful argument not to move forward with Chukchi Sea drilling. Because of the ecological and cultural importance of the region, which BOEM is extremely familiar with, and because of Shell's problems in 2012 and the high likelihood of 1,000-barrel-or-more spill as determined by this Draft SEIS, TWS supports Alternative 2 which would vacate Lease Sale 193.

As part of my work I am tracking and compiling the status of the key recommendations developed by various prestigious commissions following the BP spill. These incomplete activities make oil exploration and production

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on Lease Sale 193 tracts even more problematic. In our view, the most significant gaps in follow-up implementation include, one, the lack of issuance of Arctic-specific regulatory standards which have not even yet been proposed. Without such standards, a new administration could readily change the requirements that Shell or other operators need to meet, potentially making drilling far less safe, though certainly more economical.

The issuance of blowout preventer, or well control, equipment certification and other needed BOP upgrade rulemakings has also been lacking. This rulemaking has not yet been proposed, either.

Three, increasing the liability cap for offshore facilities, which must be done by Congress. Such an action would ensure that there are sufficient funds for response to a major incident.

Four, Congress also needs to provide protection for whistle blowers by amending the Outer Continental Shelf Lands Act to provide the same whistle blower protections guaranteed workers in comparable settings.

The new Draft SEIS and the additional information discussed above make a compelling case for decisionmakers to not move forward with Chukchi Sea drilling. The Wilderness Society urges BOEM to select Alternative 2 and thus to vacate Lease Sale 193.

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Thank you.

MR. BEN MOHR: Thank you very much. My name is Ben Mohr, M-O-H-R. Try to be brief. Probably the most important thing I can say is that I strongly encourage the Bureau this evening as you move forward to finalize the SEIS and reaffirm Lease Sale 193 and allow exploration activities to proceed. Lease Sale 193 has undergone extensive environmental reviews. It's gone back and back and back a number of times. You guys have been working on this for a very, very long time.

In addition, the hundreds of leases, the billions of dollars that have been spent to purchase those leases, the millions and millions of dollars that have been spent on employees to develop plans to move forward, these companies produce jobs. They produce investments. They have the opportunity to produce oil and gas, as well.

As I said, I could probably go on for quite a while. I think my point is pretty clear, and I appreciate your time. Thank you.

MR. GEORGE DONART: I'm a commercial fisherman. I fish in Western Alaska. The ocean nurtures the salmon that I catch. I know firsthand how remote parts of our state are and how little infrastructure there exists in most of Alaska. The Chukchi Sea coast is the most remote and has the least infrastructure of any

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stretch of Alaska's shore. I'm opposed to allowing this lease sale to go forward for two main reasons: The first and perhaps most critical is the effect of burning the oil reserves on our atmosphere and oceans. The most recent IPCC report says we have to leave most of the world's oil, gas and coal reserves in the ground if we are going to keep the world from heating up beyond two degrees Celsius.

The EIS must address climate change, ocean acidification and sea level rise in regard to this lease program. These analyses must be done in great detail. The SEIS must include a complete and thorough analysis that shows how much CO2 is put into the air, both from the development of leases in the Chukchi Sea, as well as the burning of all the oil in the reservoir. You must analyze how that carbon pollution affects climate, ocean health, and how much it will contribute to sea level rise and flooding of coast cities and areas. It must include the cost of mitigation of these impacts, as well as adaptations to these impacts.

The conclusions and findings of the IPCC must be included, as well as Department of Defense and Center for Naval Analysis analyses of the security implications of continued high carbon emissions.

The EIS must develop an alternative that includes the transition to noncarbon-based energy, such as

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renewables and nuclear energy. These alternatives must include existing and cutting edge technology, as well as technology innovation patterns and trends. They must incorporate long-term price trends of non-oil energy sources, as well as realistic economic models that include replacing domestic oil use over the long-term.

The cost of oil subsidies in the form of free pollution of the atmosphere must be included in the economic analysis. Examples would include the recent reports of how wind is now the cheapest source of electricity in the United States on a per kilowatt hour basis. The major manufacturing expansions, such as the gigafactories for both large batteries and solar panels and a strong market for electric automobiles.

My second concern is there is no known way to recover from a large oil spill in ice-filled seas. There are many aspects to this. Mitigation must include very robust oil spill response. Robust means more stringent requirements than in any other region and more stringent than present day requirements. Any development must make it as safe as possible so as not to shift the risk to residents of the North Slope area.

There is no Coast Guard presence in the Chukchi Sea. Only local residents are available to respond to a spill. Until Arctic spill response regulations based on

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experience and demonstration in the field are in place, do not allow exploration. Be able to evaluate the spill response capability under worst case weather scenario: Forty to 100 knot winds, sea ice and no daylight for two months.

BOEM must be able to ensure and demonstrate response capability. Resources must be available on board response vessels at all times with less than a one-hour response time to a spill. Crews of people from local communities must have HAZWOPER training that is updated continuously with a trainer in each village to keep everyone current on best practices.

The EIS also needs to address how the BSEE will be held accountable for prevention and mitigation of oil spills, i.e., effective response capacity and how to ensure those prevention and mitigation measures are followed through on and enforced. Develop mitigation that sets up response materials and resources and maintains them in an always ready condition.

All vessels need to be big enough to handle large multimillion gallon -- to deal with large multimillion gallon oil spills. Oil response vessels must be able to work and sail in sea ice. Vessels must be able to deal with large scale spills greater than those presently employed are capable of.

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My understanding is that the EIS acknowledges that 50 percent of oil in a spill will evaporate, but less than ten percent will be recovered. This is not acceptable and shows a complete disregard to ocean resources and the communities that rely on them.

Mitigation would include not permitting any drilling, including exploration, until BOEM can demonstrate greater than 75 percent of oil can be recovered under realistic conditions, not just in test facilities.

Thank you for taking my testimony.

MR. MATT CRONIN: Thank you. My name is Matt Cronin. I'm a research professor at UAF, and I'd like to provide a few comments. First, I was thinking during the presentation that this process started in 2007. And maybe just some academic insights.

World War II was completed in less than four years from Pearl Harbor to the surrender of Japan. The Alaska Highway was built in less than one year. And making these decisions takes a long time. I know it's not BOEM's choice. I know it's the way the system has evolved. But I think that's useful insight, and I urge within Interior, BOEM and the other agencies, to discuss that. I know there is a lot of talent in DOI and a lot of scientific expertise.

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And another point, the recent court decision on bearded seals vacating the ESA listing decision, the judge said it was overly speculative. And there is a lot of scientific expertise in DOI, including BOEM. I encourage BOEM to discuss the science issues, take license to use your scientific training and your imagination. Don't be -- don't be stifled by the bureaucratic process. Discuss it because we shouldn't have a judge correcting science when we have a government with many fine scientists. That's my main point.

I really encourage the government to not -- the government people in DOI and the other agencies, don't let your imaginations and your scientific curiosity be squashed by the regulatory process. Question the other agencies. If there is something in the EIS that's not definitive science, question it and work things out and make sure the best science is in the document.

Thank you.

MR. MICHAEL JESPERSON: Hi. My name is Michael Jesperson. To start off with, let's finalize this EIS and start drilling. Get it over with. This has been going on way too long. Since 2005 there have been over 680 lease sales. Nobody has been able to drill yet. It's ridiculous that the government took these companies' monies and isn't letting them do anything with the assets

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that they supposedly leased when they spent that money. Over 193 billion dollars will be generated in tax revenue to state, federal and local governments if we proceed with this and start drilling and working. I don't know about you, but last time I checked, the state budget was three billion short, so they could use the money and, heaven knows, the feds could use the money.

The North Slope is one of the most studied pieces of real estate on the planet. There is no need to keep doing this over and over again with the sole purpose of stopping development.

I can't say it any clearer than when I started. Let's finalize this and start drilling. Thank you.

MR. PHILIP STRAUB: Hello. My name is Philip Straub. Thank you for this opportunity. I'm speaking tonight against drilling in Arctic waters. It has been made clear that these proposed projects are neither environmentally responsible nor sustainable. We all need to begin seeing our natural resources not only as a form of energy development, but also for the beauty and value of the natural world and the importance of the Arctic landscape to all of its inhabitants. Drilling for oil and gas in the Chukchi Sea is not the right way to move forward with resource extraction.

Thank you.

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MS. JUDY STOLL: My name is Judy Stoll, and I'm here to advocate not drilling in the Chukchi Sea. The loss to wildlife and the people who depend on it is incalculable. There has never been offshore drilling without oil spills. The disaster that we had in the Gulf of Mexico recently should testify to the fact that it is very dangerous. And human beings are fallible. They make mistakes. And anything dependent on the infallibility of human beings, even if they are engineers or petroleum engineers, is ludicrous.

The gas as it is now is stranded. And it has to be brought over land, which would indicate another risk of oil spills over to NPR. Also another threat to wildlife and to the Native culture there. And I would like to add, too, that the money already spent shouldn't be used to justify continuation of the potential environmental disaster. Human -- I said this already. And we have already witnessed horrendous spills.

And I conclude with that by saying that I don't think this is the right place to drill for oil.

Thank you.

MR. JOHN DEANS: Thank you. This issue is huge, and it's bigger than just the folks in this room. And there are not hearings elsewhere in the country, and so we have a voice with us today that I wanted to present

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to you. So go ahead.
Could someone help with the volume, please?
Hold on just a second.
So can you just say your name?
MR. JONATHAN HENDERSON: (appearing via computer.) My name is Jonathan Henderson. Good evening. Again, Jonathan Henderson. I'm a resident of the Gulf Coast Region. I was born, raised and still live in New Orleans. I grew up swimming in the Gulf along the beaches of Florida's panhandle, fishing in the bayous of south Louisiana, and visiting family in coastal Mississippi.
Today I am very active in the fight for a healthy Gulf and work for an environment called the Gulf Restoration Network. I manage our field operations of watchdogging the oil and gas industry in the Gulf Region, which means taking frequent trips searching for and documenting leaks and spills and filing reports with the National Response Center. I do not know of any one person that has taken more trips than me by air, land and sea documenting the impacts that the oil and gas industry has had on the Gulf Region since April 2010. Therefore, I am uniquely qualified to deliver this message opposing Arctic drilling on behalf of impacted communities all across the Gulf Region.
In the last four years I have documented over

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100 pollution incidents that are unrelated to the BP disaster from leaking wellheads and busted pipelines on land and near shore, to drilling rigs and platforms offshore. In fact, there is a leaking well 11 miles off of Louisiana's coast known as the Taylor Energy Leak that has been leaking since 2004. Yes, 2004. If we were to travel together to this location tomorrow, I can show you a rainbow slick that stretches at least 10 to 15 miles. Absolutely nothing that the industry or government has attempted over the last ten years has been successful in stopping this leak.
If the industry has not been capable of plugging this leak in relatively shallow, warm Gulf waters, the notion that they would have the capability of shutting off a blown-out well below the Arctic ice would be laughable if it wasn't so serious.
The fact of the matter is, once a blowout happens, the damage is already done. I can take you places in the wetlands of south Louisiana where BP's oil is still there. In many locations in Louisiana's shallow saltwater marshes, if you drag your outboard motor in the mud and sediment, you will immediately have rainbow sheen surround your boat and an overwhelming stench of oil. I can take you to beaches and barrier islands along the Gulf coast where tar balls wash up on a daily basis. I can

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take you to inland bays that were once thriving with life -- birds and insects, shrimp, oysters, crab and even dolphins -- that are now nearly completely devoid of life. It is a tragedy what happened down here, not only to the environment, but to the people who for generations have made their living off the abundance of life that now seems to be dying a slow, painful death in some areas.
The biggest lie perpetuated so far in the aftermath of the BP disaster is that the industry and government has learned its lessons and now there is technology to handle any future disasters. I attend the Area Contingency Planning meetings for my region, and I can tell you firsthand that we are not ready, and the agencies charged with responding admit as much. The plan in no uncertain terms is to apply subsea, surface level and aerial toxic dispersants to sink any oil as it comes up.
The U.S. Coast Guard admits that if there were another BP-type disaster, that we would have to import boom from overseas because we still do not have enough, nor does it really work that well in the first place. They admit we would not have enough skimmers on hand, much less the trained personnel to operate them. Furthermore, Congress has failed to implement any of the President's Oil Spill Commission recommendations following the BP

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disaster.
Any person who uses his or her position of power to move Arctic drilling forward is doing so despite the overwhelming evidence that the risks far outweigh the reward and that the ability to respond to a blowout is entirely lacking. You all are the only ones --
MR. JOHN DEANS: They are calling time on you. Can you sum up one more sentence, please.
MR. JONATHAN HENDERSON: Yes. You are the only ones with the power and responsibility to prevent the risk from ever taking place. I urge you to look up the precautionary principle and use it.
The new draft analysis predicts there is a 75 percent chance of a major oil spill if these leases lead to development. I urge you to protect the Arctic from any and all future drilling.
MR. DAVID HARBOUR: Thank you very much, Doctor. The area affected by this lease sale has been exhaustively analyzed by BOEM and its predecessor agencies and by its sister agency and by a gauntlet of court proceedings resulting in a number of remands. I believe BOEM is correct in now aggressively proceeding with the four-step process mandated under the Outer Continental Shelf Lands Act. I join others in lamenting the judicial delays of what has become more than a decade-long process.

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Citizens must accept much, if not most, of the delay was imposed by the courts in response to legal challenges to your process.

While some may have disputed your own process or the competence in executing it, some of us believe the courts overreacted and overreached and in at least one case inappropriately substituted its judgment for your own. But that's water under the bridge.

The second Chukchi Lease Sale 193 SEIS now before us reasonably states the range of values of the OCS resource to the nation. That partly addresses one of the remand requirements going back to the billion barrel issue. Environmental protections have been addressed in unfathomable detail.

Ms. Epstein's Wilderness Society comments in this record urging the Congress and the Obama administration to attach vast new stipulations are specious and inappropriate. They are specious because her allies were litigants in a decade-long legal process that urged BOEM to do exactly what it has done. Her comments are inappropriate because this agency's charge is not to address Obama administration political strategy. It is to render with credibility a scientific process.

The challenge now is to successfully process the remaining steps required by the OCS Lands Act. Even with

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this step out of the way, the challenges to you, to the Secretary, to the industry are daunting, but the economic value of this work to Alaska and the national interest values to the United States demand your very best work from this point forward, knowing that part of your challenge is to permit an economically feasible project while respecting due process and eliminating causes for litigants to challenge your future processes and decisions and the Secretary's ultimate decision.

Thank you very much.

MS. LEA MERRITT: I'm not as educated on these issues as some people who already testified, but I am testifying because I think it's important to add as many voices as possible to the continued belief that we do not continue drilling unless we have truly fail-safe practices so that there aren't any spills. There are plenty of technologies that we can utilize that aren't being used at all in any of the oil fields that are already being drilled and that are not proposed in any of the plans that are in place anywhere.

We have self-healing technologies where you can self-heal holes. There are all kinds of different things that we are not using.

And I'm sorry, but I don't support any future drilling unless we have a much greater safety plan so that

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there will not be any more spills. We have already killed everything on the planet, and we are continuing to do so, and if we want to continue to do so, continue forward.

MR. PHIL SOMERVELL: My name is Phil Somervell. And basically I would request that BOEM vacate the leases for all sorts of reasons. I'm not familiar with any of the details of your methodology in doing your analyses. I have to admit that. However, I'm an epidemiologist by training, being in public health research and largely statistical in nature, so I know something about what's involved in calculating risks. And I honestly can't fathom how one could do a competent analysis of risk, given the lack of -- given the kind of data that you have, especially when you are extrapolating from what's known to the unknown of doing this kind of work in the Arctic Ocean with all of its incredibly violent weather and difficult conditions that people have mentioned. So I have questioned that.

Also, the prudential principle has been mentioned, an important public health concept. In the face of uncertainty, of which there is a lot, one has to really err on the side of caution and on the side of not doing harm such as oil spills, leaks, et cetera, especially when the cost of that caution is bearable. And it is. I understand the frustrations of my friends in the

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oil and gas industry, but those are monetary.

Climate change is not -- is a catastrophe that's upon us, and that should really be an overriding concern. Even the Joint Chiefs of Staff consider it an overriding concern in terms of our nation's security, which tells you something, that this is not just a one side of the political spectrum issue. It's vast, and people across the board are recognizing that.

Also, scientific certainty in this context, I think the phrase is almost ludicrous. The one scientific law that's absolutely certain is Murphy's law, which I respect a great deal. If something can go wrong, it will. We know things go wrong all over the place because they always do. It's a question of only when and how badly and how catastrophic. And we cannot afford it. The oceans can't afford it. The atmosphere can't afford it. The wildlife can't afford it. Our subsistence users can't afford it. It simply is time to just say no.

And I'll stop there. Thank you.

MR. NICOS PASTOS: Hello, everybody. My name is Nicos Pastos, and I'm here as an Alaskan. My job is an environmental officer for the Alaska Intertribal Council, so I'm going to briefly summarize some of our comments that we will be submitting on behalf of the 22-year-old treaty organization known as Alaska

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Intertribal Council. I'm also on the board of directors for the Center for Water Advocacy, and I help co-direct Alaska's Big Village Network, which is a volunteer organization.

These comments are aimed at Bureau of Ocean Energy Management's Draft Supplemental Environmental Impact Statement for Lease Sale 193. Simply put, the Alaska Intertribal council has been on record for over ten years as opposing Outer Continental Shelf mineral extraction, oil and gas mining of any kind. We are very concerned about the impacts -- the adverse disproportionate cumulative impacts to customary and traditional lifeways of indigenous peoples throughout the Arctic. And in particular we're talking about hunting, fishing, gathering, whatever people would call the ability to get groceries or to bring in food for sustenance.

It seems as though we have got different cultures here. The industrial oil or mineral extraction culture is moving much too quickly for the best available technology or science. We are disregarding the peoples who have lived in the Arctic for thousands and thousands of years. We are giving short shrift to our public process. We are including the peoples who live in the place, so any NEPA analysis has to have a really hard look at socioeconomic and cultural impacts to the human beings

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that live in an environment, as well as the marine mammals, the migratory birds, the subsistence fisheries, the -- the substantial commercial fisheries.

So throughout our commenting on Lease Sale 193, which is on record, it's on-line, backed up by resolutions from dozens of tribes across Alaska and reaffirmed multiple times -- I don't have them all written out yet, but simply the Alaska Intertribal Council is opposed to Outer Continental Shelf mineral leasing, mineral extraction activities.

It's very disappointing that after we had the big oil spill and the subsequent inception of the Oil Pollution Act of 1990 that we do not have a safe way to clean up oil in the Arctic or anywhere. The science -- the science is not there. So you can look at the Kulluk. You can look at every failed attempt to create a blowout preventer. The science isn't there yet.

Furthermore, the indigenous peoples who live throughout the Arctic have not been fully engaged and not in a culturally appropriate manner. We can say that the minimum has been done. And this is no disrespect to the professional people at BOEM or BSEE or BOEMRE or Minerals Management Service, or whatever you want to call yourself this year or next year.

Simply we are opposed to the harmful impacts

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that this supplemental Environmental Impact Statement leads to for Outer Continental Shelf oil and gas development. We encourage Alternative 2, which would be to completely vacate these lease sales. We don't even have a Coast Guard that can respond to protect workers, let alone the people who live there.

All right. These comments will be submitted on behalf of Alaska Intertribal Council, Center for Water Advocacy, which is a conservation organization based in Homer, Alaska, and Alaska's Big Village Network, which is an international organization.

Thank you.

DR. JIM KENDALL: Thank you. If you want to provide some comments now, that would be great.

MR. NIKOS PASTOS: When we finish reading the document, 600 pages or so, we will have very explicit written comments.

DR. JIM KENDALL: Excellent. Thank you.

MS. KATI WARD: I'm allowing Eric Larsen to speak on behalf of me.

MR. ERIC LARSEN: (appearing via computer.) Thank you for the opportunity. My name is Eric Larsen. I'm a polar explorer and expedition guide. All told, I've completed more polar expeditions than any American in history. In 2006 I completed the first ever

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summer expedition to the North Pole. In 2010 I completed a world expedition of the South Pole, North Pole, and the top of Mount Everest within a 365-day period. And last May I finished what I believe may realistically be the last North Pole expedition in history due to global warming.

While in the past, explorers have famously quipped, because it's there, my journeys stand in stark contrast because they may not be there in the future. My goal is not to chart new territory; rather just to simply discover these places as they exist today. My hope is to connect people to these last great frozen wildernesses and educate them about what they are like and how they are changing.

After spending not just days and weeks, weeks and months traveling human powered across these landscapes, I'm in a unique position to comment on the current state of the Arctic and its overall fragility. I have first person boots-on-the-ground knowledge. Make no mistake about it. The ice is melting. Over the past ten-plus years, I have seen dramatic changes in the character and nature of sea ice. More specifically, Chukchi Lease Sale 193 region is warming at twice the rate of the rest of the world. Drilling here will not only continue the destruction of this unique environment, but

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also contribute to the plague of human-caused climate change already affecting the entire planet.

To prepare for my expeditions takes years of planning, training and testing gear. To rush any facet spells injury or worse for me and my team. Arctic drilling is even more risky, as proven by Shell's disastrous 2012 drilling program, to rush the lease sale on 193. Interior should not do its work on Shell's timeline. Again, rushing the analysis is what got it wrong the first time. After suffering countless expedition gear failures, I know that the Arctic is one of the most inhospitable regions on the planet. Any oil company that says that it can drill safely in the harsh and demanding Arctic environment is putting the entire region in jeopardy.

Over the years I've had several very, very close encounters with polar bears. One jumped on my tent while I was sleeping in it. Another snuck up behind me coming within just 15 feet. As scary as these encounters were, more frightening to me is a world without these animals.

The new draft analysis now predicts there is a 75 percent chance of a major oil spill if the leases lead to development. There is no effective way to clean up or contain spilled oil in Arctic Ocean conditions. The document acknowledges a major oil spill could result in

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loss of large numbers of polar bears, and this would have a significant impact on the SBS and CBS stocks of polar bears.

After examining all the impacts of Lease Sale 193, you have ample reasons to end drilling in the Arctic Ocean in 2015 and beyond. Everyone who can hear my voice, everyone in this room, all of us on this planet, we are all the same. We are all explorers. And as explorers in the 21st century, our job is not to conquer this place, but to protect it.

Thank you.

MS. ANNE SENECA: Thank you. Good evening. My name is Anne Seneca, and I'm the executive director of Consumer Energy Alliance, and I oversee our activity of our Alaska chapter. My husband and three children and I are longtime Alaska residents, and we are very proud to call Anchorage our home. And I'm proud to stand here tonight and advocate in front of you for Alaska's economic future and for my children's future.

CEA is a national nonprofit, nonpartisan trade association made up of more than 250 corporate members and more than 400,000 individual members. Nationwide we are dedicated to developing a balanced national energy policy that will ensure adequate and affordable energy for American consumers. Our membership includes the Alaska

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Trucking Association, the Alaska Chamber of Commerce, Shell Energy Caterpillar and others that represent thousands of Alaskan workers and energy consumers.

CEA not only strongly, but very, very strongly supports the responsible development of Alaskan offshore energy and encourages the BOEM to swiftly approve the SEIS and affirming the lease sale. Alaskans have long supported responsible development of our national resources. The federal government has studied the environmental impacts of this lease sale for many years and continues to find that Arctic oil and natural gas exploration can be done safely. Sound application of science and technology and intelligent reasonable regulation can ensure that we can protect the Arctic environment while developing the necessary energy resources to fuel our economy well into the future.

A recent CEA poll found that nearly three-quarters of Alaskans -- three-quarters of Alaskans -- support offshore development north of Alaska. Energy development in the Chukchi Sea would boost the state's economy by generating 35,000 jobs annually for the next 50 years. Moreover, future development of offshore resources will help to fill the Trans-Alaska Pipeline and ensure the longevity of this critical infrastructure that is essential to the Alaskan economy.

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For our neighbors in the Lower 48, arctic energy development will ensure greater energy security, particularly for West Coast consumers who depend on Alaska energy. Taxpayers will also benefit from the 193 billion dollars in revenue that could be generated by Alaskan OCS development. It's way past time for the government to affirm Lease Sale 193 and allow exploration to proceed so that Alaskans can realize the tremendous economic benefit these resources will provide the State.

Thank you for your time.

MS. KATIE WARNER: Hello. I'm Katie Warner, and I just want to speak briefly. I just want to say I strongly oppose drilling in the Arctic. I strongly oppose any action that we can't fix. I strongly oppose any action that could wipe out a species or could wipe out food and subsistence for communities that live nearby, and I oppose any oil spills that by all accounts seem to be nearly impossible to clean up. I just think we owe our wild places and we owe our country better than that. That's all I have to say.

Thank you.

MS. MAGGIE MASSEY: Thank you. My name is Maggie Massey. I'm an Anchorage resident. And I'd like to say that first I would recommend that BOEM vacate the leases that have been given under Lease Sale 193 and do

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not move forward with any drilling in the Chukchi Sea. I appreciate the time that has been spent. People have made comments about the process that has gone through the different EISs, taking time to look at the impacts, and I want to say that I appreciate this because I think it's important to protect our wild places and to make sure that we have adequate science and that all the voices have been heard before we make these kind of decisions. So I appreciate that.

And I want to specifically note that in the presentation that was given earlier, there was -- it was noted that you wanted to look at the cumulative impacts before decisions were made, and I really appreciate that, and I think that that should be meaningful in the decisions that are made because if we look at what the cumulative impacts are beyond these 50 or 77 years, if we look at the devastating potential of oil spills, people have talked about how there is maybe a 75 percent chance of a devastating oil spill happening. If we look at the massive amount of infrastructure that would be required that would cross wild places in Alaska, if we look at the lack of recovery ability and prevention and response capabilities that we have here, and if we look at the potential devastation to traditional Alaskan lifeways that could result from drilling in the Chukchi Sea, I think

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that cumulatively we have plenty of reasons to not move forward with drilling. And so I thank you for looking at this in a holistic way and for making your decision that way.

Thank you.

MS. KELSI SWENSON: Thank you. My name is Kelsi Swenson. I'm here today on behalf of the University of Anchorage Sustainability Club. I'm the President, and we actually had a meeting today and spoke a little bit about this hearing. We just want to say for the record that we strongly oppose any drilling in the Arctic. Climate change is really our first priority above anything else right now. It's going to affect every single part of our economy, our culture and the way we live and survive. So please do not keep -- do not drill in the Arctic. And please follow through with the showing that climate change is really what's most important and what's at hand right now.

Thank you.

MR. CARL PORTMAN: Good evening. My name is Carl Portman, and I'm here to testify on my own behalf tonight. I am a lifelong Alaskan who has paid state income tax and lived on a homestead before oil was flowing down the Trans-Alaska Pipeline. Our state's economy at that time was less than half its current size. We did not

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have the modern amenities that many of us take for granted today. There were few health care facilities and schools in the bush, and overall we had a lower standard of living.

During my summer breaks from college, I worked on the pipeline both on the North Slope and in the Brooks Range. I saw for myself the care and effort that went into developing our North Slope oil fields. Overall we did a good job, but I do remember the big battles and endless lawsuits aimed at stopping North Slope development and construction of the pipeline, which has been for more than three decades Alaska's economic lifeline and at one point accounted for 25 percent of domestic production.

Opponents to Arctic energy development back then insisted that we couldn't do it safely. There were too many data gaps, and much more research would be needed before development could possibly proceed. They also warned that development would wipe out the caribou along with other Arctic wildlife.

Americans moved forward with development of the North Slope oil fields and construction of the pipeline in some of the most hostile conditions on the planet. Oil changed the face of Alaska's economy for the better.

The next chapter for oil and gas development in Alaska is the Arctic offshore. Development of energy

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reserves in the Chukchi Sea could refill the pipeline, create tens of thousands of jobs here in Alaska and the Lower 48, and keep our private sector economy healthy. We have the know-how and technology to explore safely in the Arctic, and industry has been there before, as numerous wells were drilled safely in the Chukchi and Beaufort Sea more than 20 years ago without incident.

Lease Sale 193 has undergone rigorous environmental reviews, and this area has become one of the most studied oil and gas basins in America. Industry has invested billions of dollars in the Chukchi Sea leases and preparations to explore. It's now time to move forward.

In conclusion, I urge BOEM to finalize the SEIS, reaffirm Lease Sale 193 and allow exploration to proceed.

Thank you.

MR. SUNIL SETHI: My name is Sunil Sethi. Let's face it. Like most of Alaskans, my biggest fear is an oil spill or a blowout like Macondo in the Gulf of Mexico in the Arctic. But we have to ask ourselves: How likely is it? Do you believe that 75 percent chance of oil spill? I don't. And what alternatives do we have to survive with this diminishing onshore oil in the state? The other questions that we ask is: Who owns the Arctic? The U.S. does not have a monopoly on drilling in the Arctic. It is being done by other Arctic nations. If we

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don't do it safely, then someone else will and probably do it without as much regard to safety and environmental protection than the U.S.

Therefore, I am in favor of the exploration as long as it is done safely and with environmental protection and keeping in mind the needs of the Native Alaskans.

Thank you.

MR. BRANDON HILL: Hi. My name is Brandon Hill. I'm a Palmer resident, here tonight to advocate for vacating these leases in the Arctic. I think you've heard pretty overwhelmingly tonight all the great reasons to do so. I just want to remind folks that this is much bigger than just jobs and much bigger than just money on the table that's been spent. This is talking about the ecology, the fragile ecology of the circumpolar north, and I think that's worth some time.

So thanks.

MR. ERIC BOOTON: All right. Thank you for the opportunity to provide public comment on the development of Arctic Outer Continental Shelf Lease Sale 193. My name is Eric Booton. I'm an Alaskan resident living here in Anchorage. Drilling in the Arctic is a gamble, and Shell's own program has proven they are not prepared for the job. In 2012 their own rig ran aground

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near Kodiak. Their Arctic oil spill gear was crushed like a beer can during routine testing. And their other rig, Noble Discoverer, caught fire in Dutch Harbor.

The U.S. government recently determined that if Shell moves forward with drilling in the Arctic, there is a 75 percent chance of a major oil spill. That means that if Shell moves forward with drilling in the Arctic, the polar bears, whales, other Arctic animals and, most importantly, Alaskan Native communities that depend on the Arctic Ocean for survival have a 25 percent chance of a prosperous future.

If I walked out of my front door knowing there is a 75 percent chance that I may cause harm to others, I would willingly choose to stay home. Shell is set up for failure in the Arctic. Please stand with those who call the Arctic home by vacating the leases in the Chukchi Sea.

Thank you.

MS. LINDSEY HAJDUK: Hi. I'll kind of orient this way. My name is Lindsey Hajduk. It's a tricky name. And I live here in Anchorage. And I've seen many folks in this room many times. I feel like we have been to a lot of public hearings about whether or not we should drill or not drill.

This is for the closeup. Do you want me to stand clear for your blog?

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So we have all been here many times. We know that there has been a lot of studies, and I think that I'm glad we have had a second look at this SEIS because we found out a lot of important information. We know just about how much risk we would be taking on as Alaskans. We can argue about if there is -- what percentage, what probability, how much oil. We know there will be spills with drilling in the Arctic. How much risk do we want to take on as Alaskans?

I'd say that we need to think bigger than just our economy and TAPS. And we need to think about the planet and the people who live on it, and you. This is also selfish. This is about protecting all of our ways of life and making sure that we are addressing climate change and pushing beyond using the conventional fossil fuels and finding what types of energy sources are going to get us out of this web. And we can continue to push and have business as usual and drill for another 77 years in the Arctic Ocean, or we could have a better future for ourselves and our children and our grandchildren and everyone on this planet.

So why are we continuing to come here? Because we are finding out more and more and more how dangerous and how disastrous this is. We don't have to forget about Shell's drill rig running aground, its engines catching

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fire, it limping into Seward and going under criminal investigation. That's something that they want to bring back. They want to bring the same drill, the Noble Discoverer, back. How many times are we going to let this happen, and how many times are we going to put ourselves at unbearable risk?

We need to stop. We need to have this administration buy back the leases and tell Shell and all of the other oil companies that they cannot drill in the Arctic Ocean now or in the future.

Thank you.

MR. MAYNARD TAPP: My name is Maynard Tapp. I'm a part owner of a small business, Hawk Consultants, founded here in the state of Alaska 30 years ago. I have testified supporting Lease Sale 193 and similar measures regarding oil and gas production on the North Slope, including OCS and ANWR. The stakes are high for our national independence and security. It's important that Lease Sale 193 be approved. Our nation's energy independence and the sustainability of Alaska's revenues depend on more production through TAPS.

According to the State Constitution, we have an obligation to develop the state of Alaska's natural resources. Within 50 years, the technology may be over -- may take over the need for oil and gas as the core

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ingredient for energy production. OPEC and Saudi Arabia are not planning to raise the price of oil by cutting production, which could hold the price of oil to around $70 a barrel for years. Therefore, we must increase the production to make up the difference in our projected state revenue deficit estimated at $44 per barrel for the next number of years until we can get our budget under control.

Therefore, we have both a short-term and long-term need for Alaska oil and gas supplying energy to our nation and revenue for this state. Each time we extend the time for delivery of this resource, we increase the overhead costs for delivery, which reduces profits and incentives to produce. Please stop studying and start producing the oil in Lease 193.

Also want to thank you guys for that very informative presentation you made. We see you a lot. We will probably see you again. Thanks very much.

One other thing: Regarding global warming, I think it started about 13,000 years ago when we started getting away from the Ice Age, and it wasn't caused by man.

DR. JIM KENDALL: Senator, the floor is yours, and afterwards we are going to take a ten-minute break to get our court reporter to just chill for a few

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minutes. Senator, the floor is yours.

SENATOR CATHY GIESSEL: Thank you. Good evening. I'm State Senator Cathy, C-A-T-H-Y, Giessel, G-I-E-S-S-E-L. I represent Senate District N. I'm the chair of the Senate Resources Committee, and I'm a commissioner on the Alaska Arctic Policy Commission. I'm also a lifelong Alaskan.

I want to echo what you heard from Mr. Portman about the changes that have happened economically in our state since statehood and while I have been here, too through those years.

Lease Sale 193 has undergone exhaustive environmental review, and BOEM has once again recognized that exploration can be done with minimal economic -- minimal environmental impact to the ecosystem of the Arctic. Oil and gas development in the Chukchi Sea can be done safely, and it's time to affirm Lease Sale 193. Allowing exploration to proceed is vital so all Alaskans can fully recognize the energy and economic benefits that increased domestic energy production affords.

Offshore oil and gas is strongly supported by the people of Alaska. You have heard that. And it increases the production of our nation's overall energy security. It's also a boom for job creation and, by the way, funds our universities where these nice young people

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can get their education.

Production will generate significant government revenue at a time of continued economic uncertainty at home and turmoil abroad. Steps must be taken now to ensure that we have access to energy resources in the long term so that all Alaskans and Americans will benefit from the security of a stable supply of domestic fuel for decades. For that reason, I strongly support the affirmation of Lease Sale 193.

Upon conclusion of this public comment period, I respectfully request that BOEM quickly finalize the SEIS and allow leaseholders to move forward with planned exploration and production activities. I appreciate BOEM's attention to this important matter and look forward to safe, responsible energy production in the Chukchi Sea.

Thank you.

DR. JIM KENDALL: Thank you, Senator. And we are going to take a ten-minute break, a ten-minute break only. I'm going to go by the clock. So please, let's go off record now for ten minutes and ten minutes only.

(A break was taken.)

DR. JIM KENDALL: All right. Let us start. I'm glad everyone got to their seats really quick. We have got about 18 more names to go. We have got to get

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out of the room by 10:00. I don't know what the weather is now, but they said at about 9:00 it was starting to get worse. So let's make sure everybody gets home safe and that you all get a chance to say your piece.

MR. TOM LAKOSH: Thank you. My name is Tom Lakosh, L-A-K-O-S-H, for the record. My address and so forth has been previously submitted to BOEM.

I'd like to request that the final EIS call for the vacating of the lease sales due to the inability to provide for an environmentally responsible development. Unless and until the ability to fully mitigate the impacts of oil spills are demonstrated to a certainty and, I believe, although there have been many heartfelt arguments both for and against the development either on emotional or economic rationales, that it is ultimately the rule of law which must guide and determine whether these lease developments will go forward.

And I think it's -- given the new findings in this Second Draft Environmental Impact Statement or supplemental impact statement that the likelihood of a spill now being greatly increased demonstrates that there will have to be full mitigation of any spill in order to meet your mandate of environmental responsibility. And that certainly has not been demonstrated and has been directly contradicted particularly by our nation's

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foremost scientists and the Academy of Sciences, which has recently published an exhaustive study on the futility of oil spill response in the Arctic.

Having studied this greatly myself and presented prior written testimony on both the Chukchi lease sale and the Beaufort lease sales, I ask that those written documentations be incorporated into the record, along with the prior testimony of The Wilderness Society and George Gunner as supporting the aforementioned vacating of the leases. I request that your final EIS provide for an analysis of -- a full analysis of these comments and that there be conclusions of a finding of fact and conclusions of law stated in your final EIS in response to those comments to ascertain whether or not there is sufficient basis of those comments inured to those comments and that there is, in fact, justification under your mandates to proceed or vacate the lease sale.

And I would state that the demonstrated methodology for responding to spills even under the most propitious conditions, as I mentioned in our Cook Inlet lease sale -- which I would request that the notes taken thereof in your scoping session last week, that those notes also be incorporated into my comments herewith, published and responded to in your final EIS -- that the -- under the most propitious circumstances, oil spill

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response methodology used to determine the efficacy of oil spill response equipment was overestimated by a factor of 271 in the Gulf of Mexico and that there -- the ability of spill response equipment to provide the expected level of spill containment and recovery is going to be hindered by a much greater degree by the conditions in the Arctic.

Thank you very much for the ability to comment.

MS. FRANCY BENNETT: My name is Francy Bennett, and I grew up in rural Alaska and experienced the hardship of life out there and understand why Rex Allen Rock, the President of the Arctic Slope Regional Corporation, was expressing his extreme frustration at the latest Resource Development Council meeting for environmental groups using the Arctic as their poster child, and he requested that before they do that, that they actually talk to the people in the region and talk to the leadership of the Arctic Slope Regional Corporation because they would like to see -- and I'm sure you will hear from him when you go up to Barrow.

They would like to see drilling. They would like to see it for a number of reasons. One, it would be more income for them. But most importantly, it would be an opportunity for their -- their shareholders to have jobs, specifically in oil spill response situations and in helping with the building and such -- with -- helping

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building the infrastructure up there for what needs to be there for oil spill response.

There has never been a blowout in the Alaskan or Canadian Arctic. Since 1971, 84 wells have been drilled in the Alaska OCS, all without incident. For drilling planned in the Chukchi, the water depth is rather shallow -- several hundred feet -- and is akin to the nearshore shallow water Gulf of Mexico where safe drilling practices have led to a long history of safe operations. The North Slope and its offshore are now perhaps the most studied energy basins in the United States. In the past decade, over 250 studies have been funded in the Arctic, with the majority focused on the Beaufort and Chukchi Seas.

Since 2005, 680 leases have been awarded to companies interested in exploring for oil and gas off the Alaska coasts. Despite years of applications for permits, community consultation, environmental studies and analysis, and more than 3 billion dollars in bonus payments to the federal government and investment in technology, equipment and personnel, not one well has been drilled to hydrocarbon depth as a result of Lease Sale 193.

The lease sales were sold only after exhaustive environmental analysis. When the federal government

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awards a lease sale and accepts payment, it has an obligation to efficiently process permits within a reasonable time period. And in February 2008, a lease sale on tracts of the Chukchi netted taxpayers more than 2.6 billion dollars in bonus bids. It was quite a take, especially since the Department of Interior expected to only receive 67 million before the auction took place.

Finally, I just want to urge you to quickly approve the Lease Sale 193. It's time.

MR. JOSHUA KINDRED: Good evening. My name is Joshua Kindred. I serve as the legal and regulatory affairs manager for the Alaska Oil and Gas Association, whose 14 members account for [indiscernible] development and production in Alaska. I prepared comments to deliver today touting the economic benefits of Arctic OCS development. I think Mr. Portman and Ms. Seneca has already covered a lot of those points.

But I would like to address a lot of the concerns I've heard from I guess what we could call the opposition. The first is the suggestion that because this has never been done before, it can't possibly be done safely in the future. And as you just heard, since 1971, 84 wells have been drilled in the Arctic OCS, each and every one without incident, each and every one lacking the technological innovation that we possess today.

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Another argument that I've heard made is this idea that there is a lack of studies. There is a lack of science. And as just reiterated, over 250 studies have been conducted in the past decade alone on the Arctic region, the vast majority which focused on the Beaufort and Chukchi Seas.

And finally, a lot of this discussion suggests that this is a binary decision to be made by Americans, this idea of whether or not the Arctic OCS is developed. Nothing could be further from the truth. No matter what happens after tonight, the Russians are going to develop their Arctic OCS. The Canadians are going to develop their Arctic OCS. We're going to see an exponential increase in maritime traffic. And right now if we don't support our own development, we are going to be naked. We are not going to be able to respond to this increase in risk. We lack the informational infrastructure. We lack the physical infrastructure. And we lack the emergency response systems, all of which will come with oil and gas development in the Alaska Arctic OCS.

So it may seem counterintuitive to many of those probably holding black plastic gloves above their heads behind me, but the best way to make sure that the Arctic OCS is safe is to make sure that the infrastructure is there.

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Thank you for your time.

MR. GREG HORNER: Thank you, Dr. Kendall. Good evening. My name is Greg Horner. I'm providing testimony as a representative of Shell Gulf of Mexico, which purchased its leases in the Chukchi Sea in Lease Sale 193. Shell appreciates the opportunity to voice its support of BOEM's Second Draft SEIS for Lease Sale 193. And Shell encourages the agency to continue its work to produce a Final Second EIS that addresses the Ninth Circuit decision. Shell also urges BOEM to adhere to the timeline it provided the Court in the Lease Sale litigation and to ultimately reaffirm Lease Sale 193.

Thank you.

MS. LAURA COMER: Yeah, I'm up here. I mean, I represent myself, but also I think just the future of Alaska and the folks who are growing up here, moving up here, raising families here. My concern is a lot of what the man two before me just mentioned about putting in all of this infrastructure and getting those -- the presence of the Coast Guard and the ability for local residents to respond to the spill. I don't think that that should fall on Alaskans to have to pay for those resources and that protection.

Shell has shown throughout the entire length of 2012 that they can't even safely explore. They can't even

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safely set it up. They can't safely move their drill rigs around. I'm -- I believe that through the studies that we have done so far and of which there are enough to show that this cannot happen safely, effectively, with the concerns of safety and environmental work in mind.

The citizens both here in Anchorage, across Alaska, in the Lower 48 and in the North Slope do not want to be dealing with the potential impacts and oil spills that this industry would be causing.

Seventy-five percent chance of a major oil spill is too much. In what -- in what industry would we allow a 75 percent chance of a major problem that would impact wildlife, communities? Ask folks in the Gulf Region -- in fact, we did -- what they would think of those numbers. And they would say to go somewhere else. This is not the right place for this industry. This is not the right place to begin to drill. It's time to vacate these leases, and please consider that option.

Thank you.

MS. DARCIE WARDEN: Good evening. Thank you for the opportunity to voice my opinion and testify before you tonight. My name is Darcie Warden. I work for the Alaska Wilderness League. I'm based in Fairbanks, Alaska. And I also want to acknowledge the audience. Thank you all for being here tonight. I really appreciate

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everything that everyone has to offer.

And there are so many things to say about Lease Sale 193, and so many people have said those things. And what I'd like to do is explain the black glove because for me this is about future generations. This is about keeping our environment safe for the animals and for people. This is a human issue. And when I raise my black glove, I'm saying that I care about my son and I care about the future generations, and I'm not going to have oil on my hands, not for this. So that's what this is about, because I care. And I know everyone else cares here, too.

But we have to think about the long-term impact. And 75 percent chance of an oil spill is not okay. And what it says as to me is that it's going to happen. And what that says to me is that my friends who live up north who rely on those resources, who are the people who they are because of those resources, if they are lost, people will be lost. That's not on my hands. I'm fighting that.

And that's what I'm asking for you guys. No dollar amount is big enough to be able to take care of that. It doesn't exist. We can't clean up the oil, not in Arctic conditions, not in the Gulf of Mexico, not in the Gulf of Alaska. It hasn't been done. So I'm just asking BOEM to err on the side of caution. That oil is

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not going anywhere. It's there. And there is no reason we have to rush.

MS. DA BIN LEE: Hello. My name is Da Bin Lee, and I just have a short statement. I'm a student at the University of Anchorage, Alaska, and I'm also a member of the UAA Sustainability Club. And as a member, I speak for all of us that we don't support this drilling, and we support sustainable energy as well as sustainable jobs.

Thanks. Bye.

MS. MARLEANNA HALL: My name is Marleanna Hall. Good evening, and thank you for the opportunity to be here. I'm here to comment in support of finalizing the SEIS for Lease Sale 193 and allowing exploration activities to move forward.

As a lifelong Alaskan, I know and appreciate what the oil industry has done for our economy, as well as for our nation. I believe that offshore exploration offers opportunity, not only to learn more about the resource potential, but to also better train people for future activities, both in Alaska's OCS and in the Arctic in general.

The potential for Alaskan jobs and possibilities of contracts for Alaskan businesses should not be delayed any further. Exploration and development could provide businesses, such as my Native corporation, Bering Straits,

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chances to bid on jobs and projects advancing OCS development. Not only that, but these small pieces of larger projects like the OCS can help rural and urban Alaska in both the long and short term. In rural Alaska where good-paying jobs are often scarce, an opportunity to find and train and employ Alaskans and shareholders of Native corporations will go a long way, not just one generation, but many more to come. And these advancements can help people learn ways to make it safer.

I'm concerned that resource development in Alaska will continue to be attacked by groups opposed to development anywhere, but those same opportunities will still move to other countries, some of which don't strive to protect the environment as we do in Alaska. I believe that if it's going to be done here in Alaska, it will be done right.

I encourage the BOEM to act now and finalize the SEIS for Lease Sale 193, and I thank you for the opportunity to comment today.

MR. ODIN MILLER: Good evening. My name is Odin Miller, and I'm a lifelong resident of Alaska. And I'm here this evening to encourage BOEM to vacate the lease sales. I've had an opportunity to travel to a few villages in the Northwest Arctic Borough and to dozens of others throughout Western Alaska, primarily for the

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purpose of collecting subsistence resource use data for the Alaska Department of Fish & Game. And I'd like to emphasize very clearly that right now I'm speaking solely on my own behalf and do not in any way represent the views of Alaska Fish & Game or any resident of the affected region.

During my visits to the Northwest Arctic region, I've seen the very large extent to which local residents depend on maritime resources, particularly marine mammals. Many residents of Western Alaska from whom I've solicited comments have expressed concern about various environmental factors already affecting and threatening their marine resources, as well as concerns about the potential for oil and gas development. When marine resources change in availability or quality or when they show signs of contamination, residents often have little recourse to other kinds of food. Store-bought food is very expensive and its nutritional value is far inferior to that of Native foods. Most households depend on the region's local subsistence resources, and a 75 percent chance of a large oil spill poses an unacceptable level of risk to the region's most important food source.

Pound for pound, caribou also play an extremely important role in fulfilling nutritional requirements for residents of the Northwest Arctic and North Slope.

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Unfortunately, the Western Arctic caribou herd is currently undergoing a major crash, and harvests will soon become far more heavily restrictive than they have been. The last time the Western Arctic caribou herd crashed in the '30s and '40s, residents of some parts of the northwest didn't see caribou again till the '90s. So this crash will likely increase the dependence of residents on marine resources for at least several decades due to the unavailability of caribou.

And worldwide caribou and reindeer populations have declined dramatically during the past several decades significantly due to the fragmenting of their habitats by roads, pipelines and other infrastructures. And a number of Alaska's caribou herds are currently in decline. And I've heard residents of Kotzebue mention that the road between Kivalina and the Red Dog Mine has already had a significant impact on the migration patterns of the Western Arctic caribou herd. So just imagine how much more of an impact a pipeline across much of the North Slope, the entire National Petroleum Reserve, would have toward further fragmenting caribou habitat.

Thank you.

MR. RICK ROGERS: Thank you. Good evening. My name is Rick Rogers. I'm the Executive Director of the Resource Development Council, RDC. RDC is

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a statewide multi-industry trade association. We represent oil and gas, mining, fisheries, tourism and forestry. And we believe in the responsible development of Alaska's resources, and we don't believe that we are faced with the false choice that it's either/or. We believe we can have both. We can have a healthy environment and a healthy economy.

I think one of the disadvantages of going late in the evening is a lot of people have already said what I wanted to say, but I'm here to support Lease Sale 193. It's undergone substantial environmental review over -- it's probably one of the most studied places on the planet. And once again, in the supplemental EIS, BOEM has acknowledged that exploration can take place offshore in the Chukchi with minimal environmental impact.

I think we have to put this in a little bit of perspective. I had the opportunity to go out on a platform in Cook Inlet this summer that had been operating for about 50 years, and it's still producing oil. It's still producing gas. It's producing gas. It's probably keeping us warm in this room right now. Yet in Cook Inlet we have healthy subsistence and commercial and sport fisheries, salmon resources, beluga whales. It's a real treasured environment. So these aren't mutually exclusive choices we have to make. We just have to be smart about

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how we do it.

I think BOEM has done a thorough job in evaluating the risks. I think other speakers before me have spoken about the benefits. And finally I just want to point out that whether or not we develop Lease Sale 193, the Russian oil and gas exploration multinational company Rosneft is preparing to drill less than 100 miles from this lease sale. I'm far more concerned about the impacts of their activities than ours, and I would hope we would get out there first, set an example for the rest of the world and rest of the Arctic and perhaps lead through example.

Thank you.

MS. HOPE MEYN: Hi. Thank you for hearing my testimony. My name is Hope Meyh. I'm a born-and-raised Alaska resident. As a UAA student and a member of the UAA Sustainability Club, one of those young people Senator Giessel mentioned. It is our future that the consequences of this lease sale will affect. As many before me have stated, a 75 percent chance of a spill is absurd. As a UAA double major in aviation technology, I have to point out if there was a 75 percent of an airliner crash every time you got on an airline, the FAA would be made a laughing stock, despite its economic importance. So why would this risk be acceptable here? If the

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likelihood of a spill is so great, I strongly oppose this lease sale.

Thank you.

MR. RYAN ASTALOS: Hello. My name is Ryan Astalos, and I want to thank you for taking the time to hear what the public has to say regarding oil and gas development in the Arctic. As a young biologist, a resident of Anchorage, I am concerned about the threats that drilling has on this delicate ecosystem. A rapid human-induced climate change already threatens the Arctic wildlife. We have seen this when 35,000 walruses arrived on a beach near Point Lay due to the lack of sea ice. With a 75 percent chance of an oil spill occurring, it is not a matter of if; it is a matter of when. So when this oil spill does occur, we are left with the unbalanced food webs, wildlife population declines, and a devastated environment.

I understand the need for oil and gas extraction, and that was displayed on my drive over here. However, these drilling efforts are not suitable for the Arctic Ocean. It is easier to protect than it is to perform an ineffective, costly oil spill cleanup effort.

Thank you again for hearing what I have to say. And I want to leave with you this quote. "When all the trees are cut down, when all the animals are dead, when

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all the waters are poisoned, when all the air is unsafe to breathe, only then will you discover you cannot eat money."

Thank you.

MR. KEITH SILVER: Good evening. My name is Keith Silver. I'll keep my comments brief. The Bureau of Ocean Energy Management should expeditiously finalize Supplemental Environmental Impact Statement for Lease Sale 193, reaffirm the Lease Sale 193, and allow exploration activities to proceed. When the federal government awards a lease and accepts payment, it has an obligation to efficiently process the permits within a reasonable time period.

Chukchi oil and gas resources are key to sustaining the Trans-Alaska Pipeline System, TAPS, and protecting U.S. energy security. And as mentioned before, a 2014 poll found that 73 percent of voters in Alaska support OCS development. Moreover, revenues generated from the development of Chukchi and Beaufort and natural resources -- natural gas resources could amount to 193 billion in revenues to federal, state and local governments over a 50-year period to help balance the budget and foreign trade deficit, as well as to help pay for university students.

Finally, this is also a security issue. Our

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neighbors to the west, Russia, are moving ahead with drilling. Current diplomatic relations are at best described as strained. We do not need to give them an advantage.

MS. ASHLEIGH ROE: Hello. My name is Ashleigh Roe. I was born and raised in Kodiak. In 2012 I was in high school still, and I remember the Kulluk that was grounded in the southern area of the island. This was a huge problem because every day I remember driving to school and wondering, is there going to be oil today spilled all over the harbor. The currents coming up from the south move fast, so it can affect Kodiak City very swiftly.

Also, while Kodiak has had 20-plus years of training from the Coast Guard for free, this is not enough to prevent or contain any oil spills. And even though Kodiak has a Coast Guard and the Coast Guard does go around the state, there is no base in the Arctic for any training to be had up there. Our closest base now, I believe, is St. Paul Island. That is far south. And I strongly oppose any oil drilling in the Arctic.

Thank you.

MS. CAROLINE HIGGINS: Thank you. My name is Caroline Higgins. I'm a 41-year Alaska resident, a small business owner. I have children who live in the

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state, grandchildren soon to live in the state, and I care very much about the environment and our economy.

I'm here tonight to speak in support of the Draft Supplemental Environmental Impact Statement on the Lease Sale 193. Over the past several years I've testified in support of this lease sale, and I certainly hope this is my last time to have to do this. I'm not going to repeat the details supporting the lease sale. I'm not going to expound on the exhaustive environmental review, the economic benefits, or the enormous potential and the overwhelming support of the majority of Alaskans or why it's important to TAPS sustainability. All those have been presented by others before.

What I will say is that the United States is an Arctic nation. And the reaffirmation of this lease sale is critical to preserving America's opportunity to explore and develop Arctic resources. The Arctic is an economic opportunity for America, and we should be a leader in economic Arctic development, not a follower. So I urge swift finalization and reaffirmation of the lease sale.

I also have one additional comment regarding some of the comments that were made tonight. Two of those came from people who were outside of Alaska, and it was my understanding that these hearings here are for Alaskans to provide testimony. Those individuals certainly have the

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opportunity in other venues outside of Alaska or to make written testimony. And so I have a little bit of angst with some of our time as Alaskans who came here and stood in this room being taken by people that don't live here.

Thank you.

DR. JIM KENDALL: I have been told that we have no more names in the hat. However, we still have about 30 minutes. I want to make sure everybody has a chance to be heard. So what I can do is if people want to line up at the microphone, I will keep it going for 30 minutes only. But please limit your comments to two minutes. We need your name and two minutes to make sure everybody has a chance.

UNIDENTIFIED MALE SPEAKER: What if you already testified?

DR. JIM KENDALL: You're welcome to come back and state your name and do it again.

UNIDENTIFIED MALE SPEAKER: If there's somebody who hasn't testified, I'll be glad to defer.

DR. JIM KENDALL: Two minutes. And we're wasting time here. And two minutes. If someone else wants to line up and make a comment, that's fine.

MS. SUZANNE SCHAFER: I've got to make an example for my daughter. She's sitting in the audience. She actually would certainly like to testify, having heard

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both sides. Sorry. It's kind of an emotional experience for me to do this for her right now and for everybody else in the room. And I just can't sit there and not say something based on everything I've heard.

My name is Suzanne Schafer. I'm a resident of Alaska for going on 11 years. It's a bittersweet relationship that I love and hate. I'm sure everybody can agree with me there.

I am actually a little bit aggravated at the fact that people think that this is a competition to get there before Russia or anybody else and do it better and more right. The fact is is that it is not right. Can we please make a competition maybe on how to develop renewables. We have energy resources that are so natural and so powerful that if we can think of the technology to harness them, then that's where we should be competing. That's where we should be spending billions of dollars, on new innovative ideas that are going to continue for centuries beyond, that we don't dig like dogs for everything. You know dogs go and bury everything and then they dig them up. Are we here as dogs or are we here as intelligent human beings that have been graced with the power of the intelligence to come up with new ideas that I know it's really a risk to -- to veer from things that are so secure or what is so economical for the time, but

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what's economical for the future is to look to renewables.
A very good example of one is hydrokinetic electricity. The infrastructure is going to be very difficult to place; however, I believe these are the types of energy sources that we should be teaching our children to develop. And Lilly, I love you very much.
And thank you for sharing this time with me.
DR. JIM KENDALL: Okay. Again, I'll open the floor up but, you know, I'd like to limit it to two minutes at a time. State your name. Give you your two minutes, and we'll see if there is anybody else.
MR. TOM LAKOSH: My name is Tom Lakosh, in continuation of my prior testimony. The legal standard that has to be met is whether you comply with the endangered -- whether a spill that creates what you now say is more probable than not, that the spill is -- the spill analysis is conducted in accordance with OPA 90 and NEPA.
That first has not been done even in this revised SEIS in that it doesn't analyze the impacts to endangered and protected species that may be affected under a worst case discharge scenario. That is what has to be done.
We are not sure of the reservoir pressures that may be involved here. We could have another

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60,000-barrel-per-day spill as happened with Macondo. We don't know how quickly a relief well can be drilled that was ultimately the only thing that stopped the Macondo well.
We have not had a demonstrated well capping system. The one that was supposedly tested failed. It has not been demonstrated to work under any circumstances. So it must be assumed that that spill that happens under worst case discharge does affect endangered species, polar bears, speckled eiders, Steller's sea lions, Steller's eiders, the -- I believe there is at least one, if not more, seals that are now considered either threatened or endangered.
So that it is beyond the regulatory authority of BOEM to allow development under circumstances which could cause the decline of these species to an irreparable level and/or cause their extinction. Polar bears, if I didn't mention.
So we must assume that without the ability to track oil spills in Arctic conditions, we don't -- do not have laser floor sensors. We do not have UAVs or ROVs that can detect and track oil under the ice, nor the ability to track oil in broken ice. All previous efforts to track spills in Cook Inlet ice have failed, whether they be product spills or crude spills. We have not had

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any demonstrated method of providing the encounter rates that are necessary to actually contain, control and recover oil spills generally in open ocean conditions, and much less so under conditions where broken ice or pan ice may obstruct the detection tracking and recovery of the oil.
I got time?
DR. JIM KENDALL: I want to see if anybody else has the opportunity to speak. This is the second time. Did anyone else want to speak? We have some time here. I don't want one person to take it all. Miss, you were going to say something?
MS. LEA MERRITT: I do have something. I was going to come up and say one more thing. But I don't mind if he keeps talking after that. I like the voice he's making.
DR. JIM KENDALL: Please. We have some time here, so I want to make sure everybody has an opportunity to get their point across. Again, the document is not a decision document. It is informational only to the Secretary of the Interior.
MS. LEA MERRITT: My name is Lea Merritt. I have been a lifelong Alaskan. I was born here, and I've lived all but one of my years here. I went to UAA. I graduated from UAA in psychology, and I was part of lots

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of clubs and all that.
So what I've continually seen in Alaska is they talk about it being economical to use all the resources right now, and they don't use it very effectively. It's like if you took all of your gas that was stored up for the winter and you burned it all on New Year's and you didn't have anything for spring. And that's what we are talking about right now. You need to drill right now when actually these resources might be very needed in the future, something that our future generations actually need when there aren't any more oil reserves because we are draining them right now.
And the people I know who live in the area where this is going to be drilled out, what they do with the money, they are buying enormous trucks and using more of that and then telling us that that isn't being good. I know them because they are our friends. And I don't mean to be rude, but I think that it's time to have a more long-term view of our resources as stewards of our resources. That's it.
And we don't use it. We are continuing to use our resources to build unsustainable things. We haven't got public transportation that's working well. We certainly have the technology for that. We are not using our money for that. Instead we're building highways that

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crumble in earthquakes. We have bridges that fail, dams that fail and cause all kinds of economic ruin and we're not doing anything to make them safe or -- we've got all kinds of technology. We are still not using them. And they are right in the process of being developed without -- no need to use this now. We can do it later, and we will probably need it later.

DR. JIM KENDALL: Thank you. Anyone else?

MR. TOM LAKOSH: Again, my name is Tom Lakosh, continuing my comments. To the extent that there is any question about the ability to mitigate spills and prevent violation of the Endangered Species Act or the Marine Mammal Protection Act, the ANILCA which guarantees the right of Native peoples to maintain their subsistence lifestyles and culture, there is clearly going to be, if this oil spill occurs with -- unmitigated due to a lack of effective technology, a violation of OPA 90, which demands immediate and effective spill response. That the EIS -- final EIS recommend that the environmental toll that would result from an unmitigated spill at this point in concert and as supported by the National Academy of Science report on the subject, would necessarily engender a finding of excessive environmental impact and a suggestion for vacating the leases at the present time and withholding any further lease sales in the area unless and until the

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technology can be provided by the lessee to mitigate oil spills in accordance with OPA 90 and the other laws which must require that oil be excluded from the critical habitats of these endangered species.

There is no right for any taking, particularly one to an extinction level so that you must be -- ensure a demonstrated capability of mitigation of an oil spill which has a probability higher than not of occurring during the lifetime of the lease sales and development over the lifetime of the -- of the lease sale.

Now, in addition, my comments -- my prior comments, which I hope you will review again, also address the problem of violation of law by lessees beyond their leaseholdings.

In these the oil -- the oil exploration fleets have -- do not have oil spill contingency plans that are legitimate. They -- the Coast Guard has allowed Shell to contract Alaska Chadux through the vast majority of their transit through Alaska waters and Alaska Clean Seas; to some extent, I guess, the SEAPRO in Southeast, but these are not ocean-qualified -- ocean-certified responders. They are -- Alaska Chadeux is only certified to respond in inland waterways, canals and lakes. This is an illegitimate -- an illegitimate waiver of regulatory requirements under OPA 90.

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When you lease something on the North Slope that requires a marine fleet to access that, you must -- you must acknowledge an environmental impact from that fleet throughout the regulated area. And that includes areas throughout Alaska waters where there is presently an inability to respond in accordance with OPA 90 regulations.

And the Coast Guard has provided a waiver under a fictitious authority called a remote areas policy which allows them to issue alternative planning criteria, which is a de facto waiver of the rights to equal protection under the law of Alaskans that are designed to protect individual interests and the resources which are held in trust by -- by BOEM and the other federal agencies; that you need to ask NOAA to come in and analyze whether the regulatory enforcement by the Coast Guard is consistent with both industry standards for analyzing the effectiveness of oil spill response equipment in severe sea states and in ice conditions and whether that happens throughout the -- the course tracks of those fleets that must traverse a wide area where there are other endangered species which could be subject to oil spills like from the Kulluk that ended up on a beach bouncing around with everybody holding bated breath to see if it was going to spill. It's 200,000 gallons of diesel. And there was no

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ability to lighter that -- those petroleum products off of that vessel.

If the Aivik itself had continued engine failures, it would have ended up on the beach, as well. There was no capable oil spill response organization contracted by them. They should have never gotten an approved vessel response plan with a geographic-specific appendix for any of the capping in the port zones transited by those vessels. To the extent that you have a rogue agency that is issuing permits that are not compliant with OPA 90 and will not be able to enforce the law with respect to permitting of the actual facilities that are operating on the leasehold or transiting to and from the leasehold, BOEM must determine that the environmental impact across Alaskan waters is an unacceptable risk that must be averted through a vacating of the lease sale.

I'll give somebody else an opportunity to talk while I collect my thoughts, please.

DR. JIM KENDALL: Would anybody else like to come up? We have got only about ten or 12 more minutes. We have another gentleman coming? Your name, then, and --

MR. WILL MERRITT: Will Merritt, M-E-R-R-I-T-T. I hear people on -- there is just two

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sides, yes and no, as far as I can tell here. Kind of simple. And I hear people advancing both sides of the argument, like if we do this, this will be great for the Trans-Alaska Pipeline System. But I heard from a guy who knows a lot that works on the pipeline that, why send it from the Chukchi Sea to the Trans-Alaska Pipeline System? Much simpler to run a pipeline down the Bering Sea.

Or the hunting matters. The problem with a road that goes to the mine is Eskimos to rifles. When you open the country, it allows the freedom of hunting. And when we talk about the subsistence lifestyle, it's almost over. It's impossible for Native families to feed themselves without fuel. If they don't have fuel for their snowmachine, their boats, they can't catch animals. And the food has to come in by sea or airplane. I mean, these days are over. You know, the Trans-Alaska Pipeline may be almost finished as far as Chukchi Sea goes.

You know, and global warming, it's really not a matter of whether we are going to slow it down or stop it. We are going to continue to burn fuel because I know hardly anybody who wants to be cold or not have a computer, electric lights. So it's a matter that we will burn more fossil fuels unless some miracle alternative suddenly shows up. It could happen.

Anyway, I just consider this particular area

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pretty dangerous and, I mean, there is the ridiculous argument, do you like flying in an airplane if there was a 70 percent chance, well, that's not true. But in a lifetime, a large spill defined here by 1,000 or 5,000 barrels compared to the waste pouring off this city, the nonpoint source stuff of the occupied part of North America where people are spilling oil dripping out their cars, putting pesticides in their driveway, eating everything and driving huge trucks, I mean, slowing down this project might be a good idea. I mean, this is a very hazardous area. I don't see any way a major oil spill could be -- by "major," I mean a large part of a ship load getting lost, of having any hope of containing it. I mean, it's impossible.

I mean, the ocean may be ice-free part of the year soon, but it's still full of ice almost all year, no matter which scenario we follow. I just consider it a very dangerous thing in terms of oil spill goes. And the point my daughter made about, we can leave it in the ground for a considerable time and it will be fine because it's going to be needed later. And just because we are burning it as fast as we can doesn't mean we need to burn this particular fuel right now.

That's my only remark.

MR. EARL KINGIK: Earl Kingik, last name

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K-I-N-G-I-K. I come from Point Hope, Alaska. First of all, I'd like to thank my colleagues out there that are helping protect the Arctic. Save the Arctic. Protect the Arctic. We love the Arctic. We are part of the ecosystem. We can't live without the animals. The animals cannot live without us. So I say Alternative 2, no action. No action. No action. Alternative 2. I have been through a lot of public hearings with you guys. Hopefully this will be our last, and we will never see it again because Obama will say no. No Arctic drilling. No Arctic development. No Arctic everything.

So after listening to Kotzebue, Point Hope and my friends here in Anchorage, sounds like you guys got your [indiscernible] that will say no. No drilling in the Arctic.

Thank you.

DR. JIM KENDALL: Thank you, Earl. Anybody else?

MR. TOM LAKOSH: To continue on, to add upon the impacts, the Aivik and the Kulluk were not registered with the federal government as tank vessels. They were given exemption from oil spill response plans themselves because they were considered anchor handling and -- anchor handling tugs or oil spill response vessels. But the State of Alaska actually required them to file

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plans as tank vessels because they were planned to be used to bunker the entire fleet. They were -- they were purchasing oil in Dutch, or petroleum products in Dutch, and acting as a tank vessel to bunker other vessels; in other words, having -- purchasing oil and oil products and transporting them for reuse by other vessels.

The fact that the Coast Guard exempted what are clearly tank vessels carrying bulk petroleum products for distribution should give you pause in asserting that the lease sale could be developed without environmental -- adverse environmental or unacceptable adverse environmental impact. I mentioned in the Cook Inlet sale that you would have to model an oil spill at 50,000 barrels per day for 30 days under state law to be sure your -- you would have to minimally have the rate of oil spillage from a wellhead at the maximum discharge rate of any of the North Slope fields, and then project it over the time that a relief well could be drilled.

In the last iteration, we had the relief drilling well, relief drilling rig separated by several hundred miles from each other because they were operating on two different sites. In that particular case, you could have intervening ice sheets that impinge upon access of one rig to the other and that you must consider extended transit times and the ability to break ice and

conduct a drill in the -- a relief well drilling in the middle of an ice pen.

We saw that Shell was chased off its drill site early in its top hole development in the Chukchi. We must anticipate that a relief well rig may have faced the same type of obstruction of conducting relief well drilling operations. That should be calculated into the time that there will be a free-flowing well head that is unobstructed and releasing oil at -- minimally at the 13,000 barrels per day under state law or the larger of which might be the highest producing well on the North Slope.

To follow through on that prior statement that I got sidetracked on about the Aivik and the Kulluk being tank vessels, you must also consider a spill from one of those vessels that carry large amounts of petroleum product which they are doing, and you must deny a permit unless there is full compliance with law and no exemption under an illegitimate remote areas policy.

Those vessels have to be properly permitted before they should be able to operate on any lease site. Any lease has a stipulation that they must comply with all federal law in order to maintain operations and lease in good standing. Here they deliberately circumvented federal tank vessel law with the Coast Guard and in

collusion with the Coast Guard, and that unless and until they can properly provide the oil spill prevention and response required by federal law, including the new salvage, lightering and firefighting regulations, throughout their transit of Alaskan waters, then you are effectively allowing a fly-by-night operation to illegally operate in, you know, protected waters that you have permitted.

Your permit is an attractive nuisance to a rogue operation here where they are illegally allowing in concert, in collusion with the Coast Guard tank vessels to be operated outside of OPA 90 regulatory requirements.

And I request that you make clear legal findings of fact and conclusions of law with regard to these several issues that I presented where there could be unmitigated spills which are in violation of OPA 90, ANILCA, the Endangered Species Act, Marine Protection Act, and God knows how many Fish & Game regulations which would preclude the unlawful taking and means of taking the wild species that could definitely be impacted by that 75 percent oil spill that could greatly exceed 5,000 barrels a day, much less over the time it takes to drill a relief well.

Thank you very much.

DR. JIM KENDALL: Thank you. And with

that, I think we can conclude our hearing for the Draft Supplemental EIS. Thank you very much for coming.

(Proceedings adjourned at 9:40 p.m.)

REPORTER'S CERTIFICATE

I, MARY A. VAVRIK, RMR, Notary Public in and for the State of Alaska do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that the proceedings were reported stenographically by me and later transcribed under my direction by computer transcription; that the foregoing is a true record of the proceedings taken at that time; and that I am not a party to nor have I any interest in the outcome of the action herein contained.

IN WITNESS WHEREOF, I have hereunto subscribed my hand and affixed my seal this _____ day of December 2014.

MARY A. VAVRIK,
Registered Merit Reporter
Notary Public for Alaska

My Commission Expires: November 5, 2016

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BE IT KNOWN that the aforementioned proceedings were taken at the time and place duly noted on the title page, before Mary A. Vavrik, Registered Merit Reporter and Notary Public within and for the State of Alaska.

P-R-O-C-E-E-D-I-N-G-S

DR. JIM KENDALL: All right. We are going to get over our little technical glitch by ignoring the technical glitch and just go with the front screen. In a little bit when we start the presentation, some of you may want to move closer, but before we do anything else, Harry has agreed to start our meeting off with a blessing.

(Prayer offered by Harry Brower.)

DR. JIM KENDALL: Thank you, Harry. Why are we here tonight? My name is Jim Kendall. I'm the Regional Director for the Bureau of Ocean Energy Management, sometimes called BOEM. BOEM is a federal agency, a federal bureau within the Department of Interior. Our responsibility is managing the federal waters on the offshore, which goes from three miles out to about 200 miles. So that's where our responsibility lies.

It's not just me that is here. I have a team with me. And I want to introduce the team, and they can introduce themselves. Mike.

MR. MICHAEL HALLER: Michael Haller. I'm the tribal and community liaison.

MR. MIKE ROUTHIER: Mike Routhier, program analysis officer.

MS. BETTY LAU: Betty Lau, chief REAS, resource and economic analysis.

DR. JIM KENDALL: Then the two folks at

the front desk who are probably not going to stick their head in here -- they are hiding from me -- is Heather Blood and Deanna Benedetti. There she is. She's waving. She's not going to come in. And Liz. Liz.

MS. LIZ GOBESKI: I'm Liz Gobeski. I'm in the Office of the Solicitor for the Department of Interior.

DR. JIM KENDALL: And also from the Department of the Interior, Pat, if you don't mind, would you please introduce yourself.

MR. PAT POURCHOT: I'm Pat Pourchot. I'm special assistant to the Secretary of the Interior located in Anchorage.

DR. JIM KENDALL: Thank you, Pat. Now, you all are the most important people in the room. So you are number one. The second most important person in the room is Mary sitting right here. As we get further into the evening, Mary is tasked with writing down or typing every word that's said so that we have an accurate record of what was said here tonight because this is a really, really important meeting. So when you come up here tonight, please state your names for the record for Mary. And remember that she's typing as fast as she can to get the information. You know, I'm a Yankee. I'm from Ohio. I talk too fast. And she sometimes throws things at me to

slow down. So if you are like me, slow down a bit so that we can make sure that we get every word that's said.

I have been up here a number of times. I have been here in Alaska three years now. I'm starting to learn a few things with some help from some friends in the audience -- I see they are smiling.

So this may be a little bit different from what you are used to seeing. I could stand up here and tell you why we are here and what we are doing and how important this is. But instead of doing that, we brought a PowerPoint presentation that's about 15 to 20 minutes long. And two of the people that are very important in doing this work and guiding the effort have joined us tonight, and they are going to walk us all through what's going on, why we are here so we can all start, you know, from the same basis, so all start from the same place. We are then going to take a very short break while I bring the podium over, and we are going to start the public comment period. And of course Elders will go first. Then we will go out to the general audience.

In some venues where we have a lot of people, we started putting the names in the hat. We have a nice crowd here, so we are probably not going to do that. We will just go around the room, and as people want to come up and take the microphone and give their testimony,

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that's great. If you happened to bring some notes with you to speak from, if you would, please, if you could let Mary have it because that makes sure our record is accurate. Okay?

Now, why are we here? I'm going to turn this over to Mike and Betty, and they are going to give you a little presentation here.

MR. ROBERT SUYDAM: Jim, will there be an opportunity for questions or clarification?

DR. JIM KENDALL: With this small group I think we can do that. Technically during a meeting, we usually just have the testimony -- the presentation and the testimony. I don't have all my technical folks here. If there are some questions we can answer, yes. If we can't, we will have to get back with you.

MR. MIKE ROUTHIER: Good evening. As Jim said, we are the Bureau of Ocean Energy Management, and we are primarily here tonight to talk to you about a document that we have prepared and to get your comments on that document. That document has a very long name. It's up on the board there. Chukchi Sea OCS Oil and Gas Lease Sale 193 Draft Second SEIS. And SEIS stands for Supplemental Environmental Impact Statement. It's a NEPA document. It's an environmental review document.

So again, we are BOEM. We are an agency within

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the Department of the Interior. We are going to talk about this document. We are going to walk you through how it was -- why we developed it, how we developed it and what the next steps in the process are. And we would like to get your comments on that document.

A little bit of background information about BOEM. Our primary responsibility is the development of energy and mineral resources of the OCS which, as Jim stated, here in Alaska is from two miles out to 200 miles out in the ocean. And our mission is to do it in an environmentally and economically responsible manner.

There is a lot of aspects of the program that our agency runs. We implement a five-year oil and gas leasing program that looks at various portions of the nation's OCS and determines what areas might be suitable for oil and gas leasing. We evaluate any offshore exploration or development and production plans that the agency may receive. We conduct several forms of environmental reviews that inform all of our agency's decisions. We have a robust environmental studies program that funds and initiates a variety of research in places such as the North Slope and Chukchi Sea and Beaufort Sea, and we conduct resource evaluation; in other words, evaluate what kind of oil and gas resources might be present in various portions of the OCS.

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And all that work takes place according to a four-step process. And this process is mandated by the Outer Continental Shelf Lands Act, so a Congressional act, a law that requires us to do this program in this four-step manner.

The first of those steps is a five-year program that I mentioned earlier, national level identifying areas where it might be a good idea to lease, excluding areas where it's not a good idea to lease. The next stage would be planning for an individual lease sale. If leases are sold and a lessee wants to explore, they need to submit a plan to our agency, an exploration plan. And we would evaluate each plan as it comes in, do NEPA review, look at our regulatory criteria and see if that plan meets the criteria and might be eligible to be approved.

And if a lessee conducts exploration successfully and makes a discovery, they would probably want to develop it and produce oil on those leases. They would have to submit another plan for our approval prior to conducting any development and production activities.

Here it's interesting. We are actually at the second step of these four steps. And it's a little bit unusual in that here we are talking -- we are not planning for a lease sale, per se, but we are evaluating a lease sale that has already taken place.

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The specific lease sale I'm talking about is Lease Sale 193. That's in the Chukchi Sea. This process started back in 2007 when the agency, then MMS, prepared an Environmental Impact Statement that evaluated the potential effects of oil and gas leasing in the Chukchi Sea. And that informed the decision of the Secretary of the Interior at the time about whether to hold a lease sale for the Chukchi Sea.

In 2008 the lease sale was held. The government received almost 2.7 billion in high bids and issued 487 leases in the Chukchi Sea. That lease sale was challenged in court, and in 2010 the U.S. District Court for the District of Alaska found that the 2007 SEIS that was done was deficient in a couple of ways. And they said to go back and do more environmental analysis. So the agency did.

And in 2011 the agency released a final supplemental EIS that addressed those issues of the District Court. The District Court was happy with the work that was done and dismissed the case. However, the plaintiffs in that case appealed the case to the Court of Appeals.

That appeal raised two issues. One concerned missing information and the job that the agency did in dealing with or addressing missing or incomplete

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information in its NEPA documents, but the Court of Appeals found that the agency did -- did fine in that regard. However, there was a second argument regarding the exploration and development scenario that was used in that 2007 document.

There that 2007 document analyzed a one-billion-barrel-of-oil scenario. And that's because the agency felt that because the Chukchi Sea was a frontier area and there was no prior economic discoveries in the Chukchi Sea, it would be suitable to just analyze the minimum amount of production that would be necessary to economically produce oil in the Chukchi Sea.

However, the Ninth Circuit Court of Appeals found that that was inappropriate. They said that since the document acknowledged that if the first development went in, then more development might follow, that you have to analyze all the development. So the Court therefore remanded the matter of Lease Sale 193 back to our agency and said you need to conduct more NEPA analysis.

And this is the document that we are talking about tonight, this additional NEPA analysis. It's the Second Supplemental Environmental Impact Statement, and it analyzes a much higher level of production, 4.3 billion barrels of oil.

When we started to create this document, we

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understood that it was important to talk to other agencies, and there are several cooperating agencies that have helped us produce this draft. They include the Bureau of Safety and Environmental Enforcement, or BSEE; Bureau of Land Management, BLM; the State of Alaska; and also the North Slope Borough and the Northwest Arctic Borough. Several other agencies also helped us along the way: EPA, Fish & Wildlife Service, NMFS, the Coast Guard and an agency called the Office of the Federal Coordinator for the Alaska Natural Gas Transportation Project.

The heart of any NEPA document is the alternatives analysis. You have to not analyze -- not just analyze the proposed action but analyze alternatives to the proposed action. Here in the supplemental document we're analyzing the same four alternatives that the agency analyzed in 2007 and in the supplemental document of 2011. You see those four alternatives up on the screen.

There is a proposed action. There is a no action and there is two other alternatives that contemplate deferral corridors of different sizes along the coast. In other words, those alternatives would not have leases in areas along the coast of the Chukchi Sea. There is two different distances put on. Overall to so inform the Secretary of the Interior's decision about whether to affirm Lease Sale 193, whether to modify the

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lease sale in some manner, or whether to vacate the existing leases. And a critical point is that no new areas would be offered for lease in this process. The agency is not contemplating selling leases in any additional areas in the Chukchi Sea through this process.

As I've mentioned before, the scenario, scenario being a hypothetical set of activities that you assume for the purpose of analysis, is a really critical issue here. And in this document it was Betty and her group that did the work in providing this larger 4.3-billion-barrel scenario, so I'm going to let her talk about that.

MS. BETTY LAU: As Mike said, the deficiency that the Court of Appeals found was in our analysis of impact space on one billion barrels of oil, plus some unspecified amount more. And so what we needed to do was try and come up with an estimate of how much more we would be talking about. And this triangle kind of walks you through our thought process when we -- that we had to go through to get that 4.3 billion barrels.

When you talk about all of the Chukchi, not just the leased area, but all of the Chukchi, there may be 8,500 prospects. A prospect is a place that someone might want to try drilling for oil. Of course, we don't have good seismic. We don't have good data on all of the Chukchi. So what we do is take what we know and then

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extrapolate it to the areas that we don't know about.

Then we take those prospects and we -- we look more closely at, well, how much oil could we get out at -- using our conventional technology, nothing new or exotic, if money were no object, if you could get every drop out that we could remove. And that shrinks our analysis down to 1,400 pools or 15.4 billion barrels. And we call that the UTRR. It's the undiscovered -- and that's really important to remember -- we don't know where it might be. But it's our best estimate based on the information we have right now -- undiscovered technically recoverable resources. So technically we could get it out of the ground if money were no object.

But as we know, money is important, and oil companies don't go out and drill to not make money. So then we have to apply economics to that value. And the number we chose when we did this analysis -- it seemed very reasonable last summer when we did it -- was $110 a barrel. And we applied that price of oil to our calculations and said, okay, if the oil were worth that much, how much could you produce and still make money. And you can see, then, that shrinks it down to 11.5 billion barrels.

But we are not talking about the whole area of the Chukchi. As Mike said, we are only talking about the

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leased area. So if you take away all the area that is not under lease and you think about what could you reasonably expect to produce based on the leasing in 193, and if there were a successful discovery based on these leases and you had another lease sale later and more oil were discovered because of that, so that's our cumulative -- how much could you expect to produce. And that's where we get our 6.4 billion barrels. That's our cumulative amount for Lease Sale 193, plus one additional lease sale following a success.

But for the value of just what we think could be produced based on Lease Sale 193, you get to the -- finally the bottom of the triangle, 4.3 billion barrels. So that's what those numbers mean. We went back and did our analysis from the very beginning. We took it right back to the start and did everything fresh.

Now, to get that 4.3 billion barrels, we assumed that you would have one anchor field. What we call an anchor field means one major big discovery that would be economic to develop by itself. If you didn't find anything else, you only found that, you could still make money at $110 a barrel if you found that. And the size of our anchor field is 2.9 billion barrels.

But then we thought, well, you know, if they did find one big field, they would probably look some other

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places that were nearby so that they could take advantage of the pipelines that would be in and the infrastructure that would be there and add fields which, as you know, that's what happened with Prudhoe.

So we assumed that at least one satellite field or smaller one that goes around the big field would be found, and that field would have 1.4 billion barrels. When you add those up, you get our 4.3 billion barrels.

Now, we are assuming that gas is not going to be sold at the beginning of the production because we don't have a pipeline yet. So what we are assuming they would do is what they are doing right now on -- at Prudhoe. When the oil and the gas and the water all come out of the ground, we put the gas and the water back in the ground to keep up the reservoir pressure and maintain the oil production until that pipeline is in that would carry gas from the North Slope and we could get capacity in that pipeline. So because of that and because we also included decommissioning or taking out the infrastructure after production into our schedule, it -- the scenario runs for 77 years.

Now, you have to keep in mind, you know, how we got that 4.3 billion barrels, this is one idea of if you had 4.3 billion barrels, how would you produce it? How many wells would it take? How many platforms would you

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have to have? How many miles of pipeline do you need? All of those go into developing that schedule.

So it has to go through its four phases: Your exploration -- we are assuming that a discovery would be made early on which, you know, so far we have got five exploratory wells that have been drilled in the Chukchi, and none of them has been economic to date. So that's an optimistic assumption right away. Then development is when you start putting in the platforms and your additional wells, putting in the pipelines so that you are able to produce.

And then you have your production phase, first the oil. Then as the oil depletes, then the gas sales would come on-line, and then finally decommissioning, removing the platforms, plugging the wells with cement, cleaning up the pipelines, making sure everything is returned to -- as close as we can get it to the original state.

Another assumption that we make is both production, oil and then later gas are going to be piped across NPR-A to Prudhoe and then into the main lines down south from there.

MR. MIKE ROUTHIER: Now, once Betty's group provided us with this scenario, this set of hypothetical activities, we then turned that scenario over

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to our analysts, so basically our wildlife biologists, our social scientists, our oceanographers, and we asked them what kind of impacts on the environment might result if this scenario happened. In conducting that analysis, our analysts considered new information, so information that has arisen, you know, subsequent to 2007 or subsequent to 2011, those prior documents. We analyzed impact-producing factors or those things about the oil and gas activities that might cause impacts to the environment, and we attempt to walk the reader through the impacts of this scenario through time; in other words, how would these impacts unfold over time.

We also assessed the probability of oil spills occurring as a result of these activities. For the purpose of analysis, the document assumes two large oil spills. That's not the most likely case, but to ensure that we didn't underestimate impacts, we assumed two, which is a little bit more than our numbers were telling us. And by large oil spills, the word large we use in the sense of greater than or equal to 1,000 barrels.

Looking at some historical data about past large oil spills that have occurred around the country, we took the median spill sizes and assumed for the purposes of analysis that these two large spills would be 5,100 barrels and 1,700 barrels.

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Speaking of oil spills, the analysis also updates a very large oil spill analysis that the agency originally did in 2011 just after the Deepwater Horizon event happened. And this is a very low probability event, but it's also a very potentially high impacts event. And the agency felt it was important for the Secretary to understand what kinds of impacts could happen if a very large oil spill did happen in the Chukchi Sea.

The document also analyzes cumulative impacts. So we are not just looking at oil and gas activities in a vacuum. Our agency understands that there are many other things affecting the environment in the Chukchi Sea and on the North Slope. And there will continue to be many things influencing the environment in the decades to come.

And specifically we are talking about climate change. We are talking about vessel traffic, military activities, community development, recreation, tourism. All the other things that might occur that might also impact resources in the Chukchi Sea and beyond we also considered in our document.

So where are we now? We have at least a draft document. We released that back in late October. That triggered a 45-day public comment period. We are in that 45-day public comment period right now. We have been going around the state holding public hearings. And that

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comment period ends on December 22nd. And we will talk a little bit more about how to comment in a moment.

Once that comment period ends, the agency will sit down and evaluate all the comments it receives. And we are going to make revisions to the document based on those comments. Eventually the agency is going to release a Final Second Supplemental EIS, and we expect to do that in late February of next year.

As soon as 30 days later, the Secretary of the Interior can render her decision about whether to affirm, modify or vacate Lease Sale 193.

As far as submitting your comments is concerned, you can do so here tonight by giving public testimony. It will be captured by our court reporter. Our analysts will evaluate those transcripts that are produced while they sit down to revise the document. Or at any time prior to December 22nd, you can go on to regulations.gov, which is the website that the government uses to collect public comments. And we do have a handout explaining in more detail how to use that website. That handout is in the back of the room. And I would just note that the deadline on December 22nd is actually 8:00 p.m. Alaska time.

And that concludes the presentation.

DR. JIM KENDALL: Thank you, Mike. If we can get the lights back there. We are going to move the

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podium over. And while we are setting up for the testimony and comment period, why don't everybody go back, get some more munchies -- we are not taking them with us -- and some more coffee and then we will begin.

(A break was taken.)

DR. JIM KENDALL: Looks like we are about ready to start. Since we have a moderate crowd here, we're not going to do the names in the hat thing. In some of the venues where we have 50 to 75 people and people show up an hour in advance to hurry up and get there first, et cetera, we would go to the lottery system where you pick names out of a hat on who gets to speak first. That way everybody is upset, but everybody gets treated equally. But in this case we're not going to do it here. We have got a good, manageable crowd.

And before we just go out to general comments, we are going to ask the Elders, are there any Elders who would like to speak first? You can speak at other times, of course, but I want to give the first option to our Elders who would like to go first.

MR. THOMAS OLEMAUN: I don't think we qualify just yet.

DR. JIM KENDALL: I was in one of the stores near here recently, and someone asked me if I was an Elder, and I said I don't think so. I've got a few

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years to go.

UNIDENTIFIED MALE SPEAKER: You missed out on the discount. Sorry about that.

DR. JIM KENDALL: All right. Well, then, in that case, let's begin the public comment period. Some people would like to call it testimony. We are getting all the information down, so we really need you to state your name. And if you are like me and you speak fast, I make an effort to slow down so Mary can get the notes and what was said.

And keep in mind, the document we are producing is not a decision document. When we finish this, it doesn't say what the decision is. What we are hoping for is a document that gets everybody's concerns and all the facts in there, be it science, be it traditional knowledge, so that when we present it to the decisionmaker, you know, the Secretary of the Interior, Sally Jewell, that she is confident that everything is laying out before her so that she can give this some thought and make a decision.

Again, we are not the decisionmakers. We are preparing the information for the Secretary to make a decision, and we need help from everybody, you know, all citizens, tribes, Elders, college students, to make sure the document is really reflective of the facts. And

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that's why we need your help.
The floor is open, and the microphone is here. Who would like to start? Robert, you are itching, I know.
MR. ROBERT SUYDAM: It seems like official comments from the Borough would be appropriate to start.
DR. JIM KENDALL: That would be fine.
MR. ROBERT SUYDAM: Or from the AWC, either one.
DR. JIM KENDALL: Thanks, Robert. That's a good way to get someone up here.
MR. ROBERT SUYDAM: Sorry, Boss.
MR. HARRY BROWER, JR.: Let me first say thank you to all of you for coming here to Barrow. It's an honor for you all to be here for us because we -- we know your offices are a long way sometimes in D.C. and sometimes in Anchorage, so coming to Barrow is a -- it's a great opportunity for us to share some of our thoughts with you.
Just for introductions, I'm Harry Brower, Jr. I'm the chairman of the Alaska Eskimo Whaling Commission. Alaska Eskimo Whaling Commission represents 11 whaling communities across the North Slope and down into the Bering Sea down to St. Lawrence. So we have 11 communities that we represent in regards to whaling, specifically bowhead whales.

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Thank you for the opportunity to comment this evening. Again, my name is Harry Brower, Jr., and I'm the chairman of the Alaska Eskimo Whaling Commission. As BOEM knows, the mission of the AEWC is to preserve and enhance the marine resources of the bowhead whale and its habitat and to protect Eskimo subsistence whaling.
The subsistence hunt of the bowhead whale is the most important subsistence activity for our people, both in terms of food security and for what it means culturally and spiritually to our communities. Our Chukchi Sea villages depend heavily on this resource and as ice conditions change over time, it is likely that more of our Chukchi Sea communities will come to rely more on the fall hunt of bowhead whales.
The AEWC therefore works for decades with the federal government and with industry on management of offshore activities to ensure that those activities incorporate mitigation measures that will protect the subsistence hunt of the bowhead whale.
The Open Water Season Conflict Avoidance Agreement, or CAA, is the process that our communities depend on to develop practical mitigation measures based on the traditional knowledge of our whaling captains. Through this process, our whaling captains are able to review industry proposals and to work with the operators

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to develop measures that work for our hunters and for the offshore operators. The CAA has been very successful over the years in ensuring that offshore activity can co-exist with our preexisting subsistence uses.
In its 2013 report to the President on energy development and permitting in the Arctic, the Department of Interior commended our efforts with the CAA as a promising approach to integrate the needs of ecosystems, economies and cultures.
Moving forward, we strongly encourage BOEM to work with the AEWC and our communities to build off the CAA in developing site-specific mitigation measures for planned exploration and development activities. We raise this point now because BOEM concludes in its Supplemental Environmental Impact Statement that offshore activities under Lease Sale 193 could have major impacts from disruption of our hunting activities and degradation of subsistence use areas. These types of impacts are prohibited by federal law based on the protections for our subsistence uses in the Marine Mammal Protection Act. Therefore, BOEM must be at the table working with our hunters, industry and National Marine Fisheries Service to support the CAA process.
An important step that BOEM could take right now is coordinating its review of site-specific projects to be

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consistent with the timing of the annual CAA process. Operators that are not already working with us must be encouraged to talk directly with our whaling captains through the CAA process. And BOEM should incorporate the mitigation measures from the CAA into its decisions. Simple, practical solutions like these can go a long way towards ensuring that offshore activities do not interfere with our subsistence uses. Our food security and our subsistence-based cultures and traditions depend on it.
Thank you.
DR. JIM KENDALL: Thank you, Harry. Who would like to go next? The floor is yours.
MR. ROB ELKINS: Hi. Good evening. Nice to see you guys from this afternoon. Welcome to Barrow, again. My name is Rob Elkins. I'm the Director of Administration and Finance for the North Slope Borough and speaking on behalf of Mayor Charlotte Brower, who is unable to be here tonight. It's actually awesome that you folks are here. We know that for several of you it's not your first trip, but we are glad you are here to present the Draft Second EIS for Lease Sale 193 and, more importantly, to listen to the community members and their concerns.
I'd like to offer some general comments on behalf of the North Slope Bureau, but the Borough will

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also provide some detailed written comments prior to the deadline.

The Borough is generally supportive of oil and gas exploration within the area encompassed by Lease Sale 193, provided that these activities are conducted in a manner that is safe for the environment and doesn't negatively impact subsistence activities or resources. Those subsistence activities and resources form the foundation for meeting the nutritional needs and cultural needs of many members of our community.

As you stated earlier, the development of the Draft SEIS has been in response to a series of Federal Court decisions -- you guys are far more familiar with them than I -- regarding the initial analysis beyond what was incorporated in the underlying 2007 final EIS.

This latest document specifically considers a larger potential amount of producible oil within the lease sale area than what was evaluated in the initial EIS, and an associated potential for higher levels of exploration and production activity. You are aware that these larger amounts also translate directly to a larger risk for our communities specifically as it relates to subsistence activities.

The Borough has consistently argued that if oil and gas leasing and operations are allowed to occur in the

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Alaska Outer Continental Shelf, they have to be subject to the highest standards of environmental protection, including oil spill prevention and response preparedness.

Prevention has to be the priority. The old adage, an ounce of prevention is worth a pound of cure. Where an oil spill is difficult to clean up in any water, as we saw in the Gulf of Mexico, nobody is experienced in how to do that kind of cleanup in dark, ice-choked seas. So we need to ensure that, again, there is a much higher level of preparation than what we see elsewhere in the world.

While prevention has to be the paramount goal, all levels of government, federal, state, and oil companies and the impacted communities need to be fully prepared to respond in the event of a spill. And as we have discussed today, there needs to be a lot of assistance at the local level to ensure that we are prepared to respond. The lack of response by the Coast Guard and other federal agencies to the barge adrift creates a concern at the local level about their ability to respond to something more significant.

Additional infrastructure for the oil spill response needed in the Chukchi coastal communities needs to actually be sited in these communities. Again, alluding to the barge, the first responders and probably

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for a significant period of time are going to be people that live in this area in the North Slope Borough. Since we are going to be the first responders, our residents need to have the best training available. There needs to be the best equipment. And again, it needs to be sited locally. I know that's redundant.

We saw what a delay did in the Gulf and, again, open water and in an area where there is commercial fishing. Those commercial fishermen sell their catch. As Gordon Brower spoke to you today, nobody is selling their catch up here. What they catch is their dinner table and it's their freezer and it carries them through the winter and it feeds their family. So there needs to be immediate response, and that can only be done locally.

Decisions related to offshore oil and gas activities have to be based on the best available information, both Western science and traditional and contemporary local knowledge. In many cases, and we like to believe in all cases, the best available and most current reliable information is actually local knowledge.

A lot of studies are done by people from universities that come up and spend a week here doing studies. Harry Brower spends his whole life here. A whole lot of difference between what you may read and see in a documentary and what Harry and others in the audience

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have lived for their entire lives. Current reliable information is necessary to ensure that offshore activities are planned and conducted in ways that minimizes to the greatest extent possible any impacts to the North Slope Borough residents, the Arctic marine environment, while also providing as many benefits as possible.

In addition, baseline environmental information is still needed in the Chukchi Sea. ConocoPhillips, Shell and Statoil have spent a large amount of time and resources in helping to fill critical data gaps. North Slope Borough and Shell are working to fill information needs through a baseline studies program. Even with these efforts, we need to better understand how the Chukchi Sea and the resources that our community members depend upon are responding to climate change and human activities. This information is absolutely essential if appropriate mitigation measures are to be developed to identify causes, as ecosystem changes continue to occur, and for damage assessment and compensation in the event of an accident.

Finally, oil and gas activities in the Chukchi carry a considerable amount of risk for residents of the North Slope Borough. Without the revenue sharing enjoyed by other coastal regions in the nation or the placement of

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onshore facilities to support such as transportation pipelines subject to local government taxation, the Borough receives very little benefit while shouldering all of the local impact.

We strongly encourage the Administration and Congress to work towards an equitable arrangement for the sharing of revenues received from offshore leasing and activities with the local community to help offset potential and realized local impacts from those activities.

And again, as I discussed today, the proper formula for a distribution of revenue sharing would be a direct relationship between the federal government and the North Slope Borough rather than as a passthrough through the State of Alaska.

Again, really thank you guys for coming up here. There are a lot of folks with a lot of important information that we will pay attention to. Look forward to working with BOEM as you move forward with this.

DR. JIM KENDALL: Who else would like to come up front? Don't be shy.

MR. TOM OLEMAUN: I'm next.

DR. JIM KENDALL: We know you are not shy.

MR. TOM OLEMAUN: It's pretty hard not to see my audience. All right. Good afternoon. Good

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evening. Thomas Olemaun for the record, Native Village of Barrow. I'm executive director, tribal council president. Welcome to Barrow. Lease Sale 193, it's been talked about by our forefathers. You know, Harry's generation, Delbert's generation way back in the day, but now in 2013/2014, you know, we have issues. I mean, the way they keep saying the sea is our garden, yet it's on federal lease sales. And as the federal government -- you know, as a tribal government, as a service provider for the Native Village of Barrow with about 3,600 people enrolled, you know, there is no cumulative impact for anything out there for our members because the people of the North Slope, you know, we depend on the sea as our garden, but yet there is issues that we have to go by the state regulation and federal guidelines.

If worst case scenario happens, you know, they talk about oil spill, and there is -- how about the Coast Guard is 600 miles. I mean, we are way up in the Arctic and they have been studying the Arctic for some years, and there has been issues about oil spill response team and all this stuff. Yes, we have Coast Guard here doing a little sea ice over the years. Ten years be now sea ice free. You know, it's been less ice. Delbert's generation, when they were kids, the icebergs were solid back in the '70s and '60s, but nowadays it's very thin in

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the current situation.

And all these lease sales that go to the industries, where does that money go? We are going to be the people affected up here in the Arctic. Worst case scenario happens, there is an oil spill, who is going to be -- we are going to be the cumulative impact. We are going to be impacted not by our ocean, by the industries out there if anything happens. Because if I read the EIS, you know, that 700-page document on the CD, you know, they talked about the side effects about impacts on the Exxon Valdez spill, and yet they talk about people, you know, they are depressed.

And they talk about alcohol and drugs and whatnot, but it shouldn't say that in an EIS because I read it. It's alcohol and drugs. It's addictive. It's a disease. It doesn't matter if there is an oil spill or not. Shouldn't be printed in the EIS because we people up here, everybody depend on oil and gas throughout the nation, but yet all these things are happening.

Yes, we have the Arctic Slope Regional Corporation. Yes, we have the North Slope Borough. And yes, we have the tribal government. But as tribes, you know, we are a program service to our members, but yet we don't get any impact stuff or impact aids to provide more services for our tribal members. Where does that money go

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when BP or Conoco get fined 300,000? It goes to the state of Alaska. But out there in federal waters, you know, we are a federal government, too, like you guys are; BSEE, BOEM, Coast Guard and whatnot.

You know, it's nice to have BOEM here and welcome to Barrow, but we should have Coast Guard, BSEE, BLM -- I see back there State of Alaska -- you know, a roundtable discussion. Instead of repeating ourselves so many times to one agency, there should be all the federal government agencies represented up here. And that needs to start happening because we keep saying the same old thing. My dad back in the '70s, you know, they talk about the sea ice and the currents, ice currents, sea ice currents, all these things happening, and yet they did not prove about cleaning under the ice or anything like that, because our currents out there are pretty fast.

And it's just more communication. If we sit on the table with all the other agencies, you know, we will be on the same page instead of repeating ourself over and over for 30 years about this happening and whatnot because if anything happens, then -- there is a pipeline under the water. Next thing you know, there are going to be roads to the Trans-Alaska Pipeline. And it's going to affect everybody up here on the north slope.

I mean, we have no road access to the villages.

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It's a high cost of living up here. I mean, it's just outrageous prices, especially in the villages. And there is no competition. There is no economic development. There is all these issues we have to hurdle by. But yet our own marine mammals are either threatened or endangered species. And it's just about time that we get together and probably create our own North Slope Borough Coastal Management Plan because the State of Alaska Coastal Management Plan hasn't worked, but if we create our own up here, at least we will have a plan for anything that happens up here. Our own, very own.

And thank you. Good evening.

DR. JIM KENDALL: The floor is open for anyone. I see lots of -- excellent. Thank you.

MS. ROSEMARY AHTUANGARUAK: My name is Rosemary Ahtuangaruak. I'm a member of the Inupiat Community of the Arctic Slope. I'm also a member of the North Slope Regional Advisory Council, co-chair, and a participant with the National Tribal environmental health think tank. I'm a resident here in Barrow, but I've lived on the North Slope for a number of decades now. We have expressed generations of comments over the years. The importance in all of those generations of comments are important to bring to this discussion today. The historical changes are not included in the understanding

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of your documents as we understand them, and some of these discussions are really important to bring to this process before us.

I've brought a lot of concerns over the years related to the process because I worked as a community health aide in the village of Nuiqsut. Living in the village near oil and gas development when I first started, there was only one person who used medicine to help them breathe, but as I continued to live in the village and oil and gas development got closer and closer to the village, the increased health problems increased in the village.

There is now a lot of research that is available that shows that a lot of the processes around the oil and gas development are negative to human health. There are chemicals of the emissions related to the development process as well as the flaring of the gas that occurs around the oil and gas development. They have chemicals that can affect our human bodies. The neurotransmitters or the endocrine disrupters, these are things that can cause us to have some real serious health problems.

We already are seeing an increase in concerns around diabetes, heart disease and hypertension and other things, but we don't have the research that says what are these chemicals that are being emitted in the tons and tons per site. What is it doing to our bodies? We don't

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have that existing information.

We do have a health assessment. We do have a health impact assessment associated with NPR-A, but we do not have a health impact assessment for the offshore. We also need a human rights assessment of the impacts to oil and gas to us.

And it is really important that this process get started because the reality is there are a lot of human rights that are also at risk with this document and the risks that are cause for us to be concerned.

When you have to live in the village and you see people coming in, they have trouble breathing, and you deal with these little babies, and they are -- you don't get to go to sleep at night because you have many babies that are having trouble breathing, you get very aggressive and try to come to every one of your meetings that say you are going to come out and change our lands and waters and increase the risks to our health of our future generations.

So I keep coming back here and I keep learning more and more information. But we don't have a lot of the information that we are learning from the Lower 48 around the Gulf spill, as well as other areas where fracking is occurring in oil and gas development processes. And there is some really good information out there that gives us

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more concern. And this information from a human rights assessment of hydraulic fracking of natural gas was done for the State of New York, and there was another one that was done for the United Kingdom. I can leave you additional information about that in our written comments, but I only have one copy and I'm still working on communicating with them, so I can't leave them with you.

But in here it shows a lot of the concerns that I started as health aide asking questions, what's happening to our village. Why are we having these health impacts? And yet more and more oil and gas development was the answer that came to our region.

The reality is our state and our federal government has increased the impacts to our villages, especially the villages that are near where these activities are going to occur. Here in Barrow we have a flare that occurs three miles from our new hospital. That is a very concerning issue when we don't have the appropriate filtration that could occur in that flare to reduce our impacts.

We don't have the appropriate mechanism to make sure that they are burning at a high enough degree that they incinerate the particulates and decreasing impacts to us, as well as we don't have a design in the process to make sure that concerns that are coming from the oil and

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gas development process require informing the public so our public can make an informed decision on whether or not they want to come into Barrow to deliver their babies and be exposed to the oil and gas development process that is occurring here in Barrow or elsewhere.

All of these concerns with are cumulative health effects, and we're seeing more and more problems with leukemia occurring on the North Slope. There are many people that are dealing with this problem. We don't have a strong enough hospital for us to deal with these kinds of cases. We don't have enough technical expertise at our new hospital to deal with one patient, let alone many patients. The costs that occurs to our villages can bring a person out with those problems or a child, it's a very expensive cost when you have people that have hats to be other care providers for our community. Maybe they are our fire chief, maybe they are our mayor, maybe they are our teacher's aide, but they are very important roles that also leave when they get sick, and it's an important economic cost that's not assessed in some of your assessments of these issues. These are astronomical costs, and our Indian Health Services do not have the resources to allow us to effectively treat and assess and care for these illnesses, let alone the reality that these processes have already been paid for with the previous

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development activities for oil and gas, let alone the existing oil and gas development process, let alone the future oil and gas development processes. These have been paid for in advance, but they never gave us the upgrade to our hospital system to give us the best quality care.

Yes, we have a new facility, but it was designed on the same square footage of 1950s of what was necessary for patient care, and that's not adequate with what's really needed. And now when you add the complexity of having multiple illnesses within one person, let alone one family, the costs are astronomical having to come back and forth. We don't have the resources to bring everyone in if they have a cardiac problem to go to the dietitian, to go to the internal medicine doctor, to go in to the radiologist, to go to all the other associated assisted needs to deal with heart disease. And yet we are risking all of our population with increased emissions from one site, let alone many more that are going to come with these lease sales. These are what's really important.

But when you deal with these little babies' eyes and you have the mothers that are now coming to me and asking me, am I having reproductive health issues because of exposures that have happened to me -- you have several of [indiscernible] come to you and ask you when you go to the village. It's a very serious concern. I had that

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happen two weeks ago. It's a big concern, yet there has been nothing. We don't even have the data sets existing with our health assessment or the health impact assessment to say what our impacts are to health from oil and gas development. We still have to get the data, and we have to work with our tribes to even get the data out of our own state data systems because it's not [indiscernible] to allow us to be able to assess from the state data sets what our tribal exposures are.

All of these issues are tremendous issues and it's very concerning when you are dealing with this process because the reality is we are dealing with the risks of living here where oil and gas development is, as well as if there is an adverse event. And if there is an adverse event -- we have already failed to learn from the Exxon Valdez, what it did to the health of the people down there -- we still have failed to enforce getting a good health impact assessment with the Gulf, and yet you are coming here with another lease sale for us in Barrow. It's not right. It shouldn't occur this way.

We need these assessments to occur now before you come up with these licenses to say you are going to go out and do more drilling. The reality is you failed in the previous process, and we had to make you go back and redo it because we knew with our traditional knowledge

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that it was not a good assessment. Now we have more data that says there are a lot more concerns that we did not assess and we have no resources -- nothing in this document is going to trigger any resources to come to us when we have an adverse event, let alone prior to preparing for an adverse event and helping us to expand what the resources we need.

We don't have enough resources for our fire department to be able to go out and respond in our coastal event if there were a fire with one of these boats. We don't have a fire boat out here. We don't have a lot of the basic equipment. We don't have control of our own training needs to be associated with these efforts to train our personnel to be able to respond appropriately to these adverse events. We have to work with the industry to get even to the table to have the training. That's not appropriate. We should be triggering to have all of these resources already here for our community to be able to respond.

We are dealing with a comprehensive plan for our villages and for our region, and yet within that document still we do not have any triggers to allow our tribes to have any resources to be able to respond to any of the needs to have this comprehensive plan. We need to have these triggers incorporated into these documents so that

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we get resources here prior to the event so we can get prepared and so when that when it does happen we have people that are able to go out, as well as recognizing the losses of the people that are going to happen because we have family members that talked about losses that occurred to health of people when they responded to the Exxon Valdez.

And the reality is our families shared with families that didn't have food down there. And we have to have areas of our state that are going to be able to give us whale if there is an adverse event in our ocean.

So please, this is very important. You have a document that shows that we are a very high risk for this process, and reality is the profitability for this is not for our benefit. The risk is for this.

Thank you.

MR. ROBERT SUYDAM: Good evening. It's tough to go after Rosemary given the passion that she brings to the table every time that she comes and gives testimony at something like this.

My name is Robert Suydam. Last name is spelled S-U-Y-D-AM. I'm a senior wildlife biologist with the North Slope Borough. I've lived in Barrow for 25 years and spent a couple years or a couple summers up here before I moved up here.

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Today, though, my comments are not from the North Slope Borough. Rob Elkins gave the official Borough comments on behalf of the mayor. And my points are -- my personal comments may get incorporated into some of the Borough comments that are submitted as written comments later on. But again, today I'm just speaking for myself.

I'd first like to thank BOEM for being here, for giving the opportunity for North Slope residents to give comment on this action. That, of course, these public hearings are important and appropriate. And Jim, you being here, the director for BOEM in Alaska, to me that shows how important these hearings are to BOEM and that you really do want to hear from the communities.

I'd also like to thank Pat from the Department of Interior for being here, and that also shows me how important these meetings are for the government. And so thank you for that.

The reanalysis for Lease Sale 193 I think was incredibly appropriate. We have been hearing for quite a while from industry that there is potentially a huge amount of oil out there. And so doing this reanalysis and looking at the risks of increased activity that comes with the potentially larger reservoir, larger reservoirs, is an appropriate thing for the agency to do. So thank you for doing that.

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And of course, with the large amount of oil that's out there means that a lot of activity could come along, very likely will come along unless oil prices continue to go down; but I suspect that they will turn around at some point and there will be a lot of interest -- continued interest in the Chukchi Sea.

With more oil, of course, means there is a greater risk in many different ways. The residents of the North Slope and the resources that people up here depend on have realized the potential risks for many, many years. Some of those risks from oil and gas exploration, of course, are noise and what noise does to marine mammals. Of course, there is a lot of risk associated with a potential oil spill which a few folks have talked about tonight. And there is also just the presence of the infrastructure. There is the presence of the vessels on the water. There is the presence of a lot of people from out of town coming to the villages, coming to the communities and taking up resources.

And with potentially increased development in the Chukchi Sea, I frankly don't think anybody is ready for this. If there is the amount of oil that is out there that is being evaluated in this EIS and the supplemental EIS, the changes that could occur in Wainwright and Barrow and other places on the North Slope could be gigantic, and

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the infrastructure isn't in place to deal with it. And that's a concern because to develop infrastructure takes years and years and years.

Thinking about oil spills, you know, I say, man, if there is an oil spill, it's going to be devastating. If there is an oil spill, there is so much money that gets pumped into the system to take care of it that it will be dealt with. But people that say that haven't been to Wainwright. They haven't been to Point Lay or they haven't been to Barrow. They don't realize that you could land a plane and park one large plane at those landing strips -- not necessarily here in Barrow -- unload it, and then move it before another plane can come in. So it doesn't matter how much money is pumped into the system; the system doesn't have the capacity to handle a large response. They don't have the capacity to handle increased development, even at five years out or ten years out. There is a huge amount of work that needs to happen and there is a huge amount of potential impacts to the communities, to the subsistence hunters, and to the resources.

So of course, in an EIS, it's really assessing the risks, assessing the impacts from the agency's proposed actions.

And first I guess I want to talk a little bit

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about impacts, a little bit more about impacts to people. I distinctly remember in 2006 and we were sitting in the federal building in Anchorage. It was an Open Water meeting, and a lot of companies had come back and said we want to go out there and explore. We want to be out in the Chukchi Sea looking for oil.

And Mayor Itta stood up and said, this is too much. It's too fast and it's too soon. There is too much activity, too much interest. It's happening too quickly, and it's happening too soon. And even though we are now eight years past that, it's still too much. It's still too fast. And it's still too soon, that we are not prepared to deal with it. And I think the EIS has tried to evaluate the risks, but I just don't think a document like this can really delve into the real risks that are there and that need to be dealt with.

Unfortunately, the benefits to the communities don't really -- in my view, don't really outweigh the risks. There is no revenue sharing, you know, so most of the funding goes into the government's pocket. If people start selling oil, it goes into the companies' pockets and their shareholders' pockets. And of course, some of the corporations here are partners with oil companies, and so there will be some funding that comes to the corporations, and there will be some funding that comes to the North

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Slope Borough with infrastructure built on land. And that's all positive. But something needs to be done to change the balance of risks and benefits for all of this work to go forward. There needs to be more benefits to the people that live on the North Slope that outweigh the risks.

So in the evaluation of impacts to people, I didn't -- I couldn't tell in the document -- I haven't had a chance to spend as much time looking at it as I would like. In part that's because there is too much happening here in the Arctic. A few years ago, I facetiously said the federal government has more Arctic initiatives than there are people who live in the U.S. Arctic. And that's an exaggeration, but the number of people that attend the meetings is a lot less than the number of people -- or the people that comment on these kinds of things is a lot less than the number of people that live here. And so maybe the people that are involved in these kinds of discussions, maybe the number of Arctic initiatives by the federal government actually do exceed the number of people living on the North Slope that participate in this. So to me that's a major problem, that, you know, BOEM or the other agencies, whether it's a lease sale or some other action -- there isn't enough feedback because there aren't enough people that have enough time to look at these

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things as deeply and as thoroughly as they should.

Of course, having all this activity creates stress, and stress deals with some of the things that Rosemary was talking about, some of those health impacts on people. Some of it may be related to the things that Rosemary talked about -- air quality issues, water quality issues -- but a lot of that is compounded hugely by stress, by having lots of changes happening in the community, whether it's related to oil and gas or whether it's related to all kinds of crazy scientists that are coming up to the North Slope and doing work, or whether it's related to the climate and it's changing. There are so many things happening that it creates a huge amount of stress in all the people.

And again, I haven't spent a lot of time looking at the EIS in the way that I would like to, but I suspect the EIS really doesn't take into account the amount of stress that folks are experiencing and how that influences some of the other health aspects that the people are struggling with.

Of course, there are impacts on subsistence. And subsistence is critically important for the people that live here, for the culture that lives here, that subsistence provides huge -- it helps fulfill the nutritional and the cultural needs. And frankly I haven't

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seen anybody that is able to evaluate impacts on culture in an appropriate way. You can't simply -- if there is an oil spill, how do you assess the damages to the culture? How do you compensate for those damages? Frankly, I just don't think it's possible. And so that's a huge struggle that I think we all are going to struggle with in the coming years. It's certainly a large topic and issue that BOEM needs to deal with, but it's a large topic that we all need to struggle with and figure out how to deal with.

Impacts to subsistence, of course, often are caused by impacts to some of the subsistence resources. And I have noticed in the EIS a couple of places that talk about impacts that we didn't catch earlier as a cooperating agency, and I'd like to just kind of point out a little bit here now.

In the cumulative effects section on page 595, the EIS talks about potential impacts from the proposed activities on different marine mammals. And in that table on page 595 it says that the impacts to bowhead and beluga whales could be moderate from the activities in the preferred alternative, at least if I'm understanding the table correctly. And yet later on in the analysis of the cumulative effects, the first sentences in the summary of effects on bowheads and belugas are that the effects from the activities, from the preferred activity or from the

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preferred alternative will be negligible. And so I don't understand how the impact assessment in Chapter 4 that's talking just about the activities from the lease sale could be moderate, but then the cumulative effects could be negligible. I don't understand it. And maybe I just haven't read it carefully, but just it leaves me struggling to figure out what's going on.

The section on walruses is another example where it focuses on disturbance and that the activities are likely to cause disturbance to walrus, and that's absolutely true, given that Hannah Shoal in the lease area is so important for feeding walruses. Unfortunately, I don't think that there has been a lot of evaluation on the impact to hearing of the walruses. Walruses seem to be much more tolerant of seismic vessels or other human activities. And right now we know amazingly little about what walruses hear, how sensitive their hearing is in the air or in water. And so it's a data gap that needs to be evaluated and a risk that needs to be assessed.

Of course, the EIS is not only trying to evaluate impacts, but it's also trying to mitigate impacts. And so I'd just like to comment on a couple of those things. That, you know, for mitigating impacts to bowheads, as Harry mentioned, the CAA has been remarkable at allowing the whalers, especially in the Beaufort Sea,

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to go out and hunt whales and provide food for the community, provide support for the community culture and community events. And so please, BOEM, continue to support the AEWC and that agreement that they have with the oil companies. That really does help mitigate impacts to the subsistence hunt for bowheads. And of course, it then also provides some help for bowheads and reduces impacts.

For belugas, I've often been troubled by how BOEM does things as well as how NMFS does things in their issuance of IHAs with regard to belugas in the Chukchi Sea. Over and over and over again I've heard people from Point Lay -- and I have said the same thing -- that please do not let activities occur in the Chukchi Sea even 50 or 60 or 70 miles offshore until the beluga hunt in Point Lay is done. Once the beluga hunt is done or July 15th, whichever comes first, then it's probably okay to send ships out there. It's probably okay to have activity out there.

But right now the best available science is that belugas that come to shore near Point Lay are coming from offshore. They are not coming from down the coast. They are coming from offshore out where the activity is. And they are coming to these coastal concentration areas. So if the belugas are disturbed before they get to the

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concentration areas, they may be deflected or they become so skittish in their behavior changes that it becomes harder for the beluga hunters in Point Lay to get what they need. So please, please make sure that that becomes an important part of what decisions are made.

I think it will be easy to make it very adaptive so that companies are required to stage their vessels outside of the area and be in communication with Point Lay. And as soon as Point Lay is done, come on up, do what you need to do. And so please listen to the folks of Point Lay.

I'd also like to kind of mention this as something to consider in mitigation that is important. There are some areas that obviously are really valuable for hunters, especially coastal areas. Please make sure that you work with each community and the hunters to make sure that what the companies are doing, what the oil companies are doing is not impacting the resources that are in those hunting areas. Hannah Shoal, of course, is very important for walruses. Given that walruses are being considered for listing under the ESA and potentially could impact subsistence hunting at some points or another, need to make sure that their feeding habitats is protected and their coastal haul-out areas are also protected.

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Barrow Canyon and then also the spring lead, of course, you have heard many times how important those are. You've heard from many hunters, many residents of the communities and many different scientists.

Of course, this EIS, one of the things that motivated it, of course, is looking at greater oil that may be out in the Chukchi Sea. And cleaning up oil thus becomes something that's really, really important. Recently I've served on a national research council panel to look at preparedness of the Arctic for responding to oil spills in the Arctic. And it was pretty obvious that the conclusion of the folks that were on that panel and everybody that presented to the panel is that you can't clean up oil or you can't clean up very much oil, even in the best of conditions. So when you throw in ice and you throw in darkness and you throw in wind and you throw in the remoteness of the Arctic, that cleaning up oil becomes even more difficult. It doesn't mean you don't try. It means you spend more time trying to prevent oil spills. But it also means you spend more time being prepared.

And as Rosemary mentioned and others have mentioned, the resources don't exist now to allow communities or to allow the government or to allow the companies to be prepared to deal with an oil spill in any kind of fashion. And so what does it take? It takes

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resources, of course, to train people. It takes resources to have response equipment available to be able to respond. And the money hasn't been there to date. Oil companies have, of course, invested lots in their spill response capabilities offshore, but what happens when the oil comes near shore?

So one thing that I've been thinking about is OPA 90, Oil Prevention Act of 1990, sets aside a bunch of money to respond to an oil spill. But unfortunately, OPA 90 doesn't allow those funds to be used to prepare for an oil spill. And so using OPA 90 -- using some of the funds or perhaps changing the taxing structure on oil so that OPA 90 funds or some remnants of OPA 09 funds could be used for oil spill preparedness. That may be a way for the government to find the money to allow for communities to be prepared and be better prepared for whatever might happen in the future.

I guess just a couple of other things. Thanks for letting me take so long, by the way. I'd like to comment on cumulative effects assessments in the EIS. I have never seen and still have never seen a cumulative effects chapter in an EIS that, in my view, is adequate. It's -- they are -- they have always been opaque. They are not transparent about how people reach their conclusions. They have never been objective, in my view,

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in part because they are not transparent. And that needs to change.

And frankly, I think it's something that agencies are really vulnerable on, that listing the different activities that may be occurring that could affect bowhead whales or beluga whales or people, whether it's activities in Russia or activities in Canada or all the past, present, and reasonably foreseeable activities in the Chukchi and Beaufort Sea, that just listing those isn't an analysis, in my opinion. It's not objective. The conclusions aren't -- there is no -- there is no trail. There is no connection between the list of all these activities and the conclusions that the cumulative effects would be negligible or moderate or minor or whatever the conclusions are.

And I think that we all should work together to figure out how to change that to make the process easier to understand and easier to implement. So I encourage BOEM, whether it's through this EIS or the studies program or some other mechanism to really pursue that. Strides have been made in academic circles to improve cumulative effects, and I think there are some good potential things out there that could be used.

One of the other things that isn't in the cumulative effects section, especially as it relates to

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impacts on people, is that the management actions of your sister agencies haven't been evaluated here. Somebody earlier -- I think Tommy mentioned, you know, that many of the marine mammals are now being listed under the Endangered Species Act.

So with the listing of critical habitat, with potential regulations that come along with listing under the ESA, it means there is additional stress on people and there may be additional regulations on people. So if folks aren't able to hunt polar bears or if they are able to hunt fewer polar bears and there is all this oil and gas activity going on, and there is this climate change going on, that all of these things pile up on the communities and on the hunters, and it affects food security and it affects the ability of communities to provide the nutritional and cultural needs that are there.

So I think, again, it's worthwhile to include those kinds of things that your sister agencies are doing. Just today a listing of critical habitat, a proposed rule for listing a critical habitat for ringed seals was released by NMFS. We have all known that that was coming. And including those kinds of things in the cumulative effects section would be worthwhile.

So as Rob Elkins mentioned in the Borough comments, that decisions really do need to be based on

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information. They do need to be based on science. And I want to congratulate BOEM on the huge amount of information that you have collected over the last 30 or 40 years that those -- that information has certainly helped with the analyses, that -- you know, the cumulative effects analysis, impact analysis. But there is still a huge amount that is needed. We're talking about a giant ecosystem, a giant area with very few people, very little infrastructure, and it makes it very difficult.

So BOEM has made great strides. Oil companies have made strides. The North Slope Borough has invested lots of resources in trying to better understand how the Arctic works and how the resources and the people interact. But that needs to continue, and that information needs to be used to inform decisions.

So again, thank you for letting me drone on for a long time. Thank you guys, too, for letting me talk a lot. I really appreciate it. And thanks again for being here.

DR. JIM KENDALL: Thank you, Robert. To be courteous to our court reporter here, Mary, typing, can we take a ten-minute break, give her a chance to rest her fingers? This is very productive. Thank you. Ten-minute break.

(A break was taken.)

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DR. JIM KENDALL: We are now back in session. The floor is yours. And your name, please.

MS. SARA THOMAS: My name is Sara Thomas. I am a resident of Barrow. I've lived here for 18 years since I was a child. I am a professional. I work here at Ilisagvik. I have children in the North Slope Borough School District, and I'm the wife of a hunter, of a subsistence hunter in Barrow. I'm also a UAF rural development student. But I'm here representing myself, my personal views and opinion. And like I just told somebody, I'm kind of representing people who don't read these long documents, which is most of us. Let's be honest.

Some questions that I have that I'd like to see in this report, if I had the time to sit down and read it between being a full-time mother, professional and student, I'd like to know: How much money are human lives worth? I'd like to know: How much money is Inupiat culture worth? And I'd like to know: What is the nutritional value of the U.S. dollar? These are important questions that I think are really -- really should be reflected in this large document that you have provided.

My second question is about jobs because I hear that a huge reason for continued development of our -- of nonrenewable resources here on the North Slope is that

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it's going to provide more and more jobs for locals here. I would challenge you to go on an Alaska Airlines flight to the Slope. We have to all the time because our flights go from Anchorage to -- or Fairbanks to Prudhoe and then to Barrow often. My observation is there are very few local people. My observation from hearing conversations is they don't like their jobs.

I'd like to know -- I'd like to know what this does for our society here. And there is some research. I'm going to cite The Institute of Noetic Sciences, which I realize is somewhat of a pseudo science because it's new, but there is research about mass consciousness and its power over the society. So this is why I think this is a really important aspect of what's going on here. How does the unhappiness factor of people that are here solely for money, how does it affect us here? How does this affect them when they go back home and their families?

My third question is I would also like to know how these developments are affecting myself, my toddlers, my unborn child. I'd like to know how we are being affected by the gas flare that's out there at gas well. And I'd like to know this in layman's terms, otherwise known as human terms, which is not what I've observed in these large booklets.

I would just like to comment that although, yes,

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we do use vehicles -- I'm going to leave here in a vehicle that is going to burn a fossil fuel -- that yes, I do use a lot of plastics, I'm not 100 percent anti-development. I am 100 percent pro-sustainable development. And what we have now is what we have been given, and it's not -- it's not good. We want a better way. When I say "we," I mean people of my generation. I'm in my twenties. If you look at trends, current trends, do it yourself, chemical free, free trade, sustainability. These is -- this is what we want. We feel that continued oil and gas development is clinging to go a way that has proven to be bad in so many ways for our society, whether it's on dependency, whether it's climate change.

That's all I have to say. Thanks for letting me speak.

MR. PATRICK GRIFFIN: My name is Patrick Griffin. I'm also one of the directors at KBRW Radio, but I'm here by myself.

A few things: Like on the oil spills, I know that they are going to want to use oil dispersants like they did in the Gulf. And then EPA told them to stop, but they never did. They just took a fine. And then the health factors. Everybody got sick down there, which goes with her, using the oil dispersants. And then they couldn't use any of the shrimp or anything like that.

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There is no tests on what the effects would be on the plankton that the whales use here and also the fish they will be eating. Everybody eats their fish around here. Goes through the ocean, then it will go through the oil dispersants. We need to have a test on the oil dispersants to make sure it's safe to use for the environment, for the nature, because it did so much destruction in the Gulf.

And let's see. The next thing, we don't have any way of stopping an oil spill. Just at 100, 120 feet, that's just like taking a big old, say, foot-diameter hose at 80 pounds of pressure and hitting concrete on the floor and it just bursts so fast, where in the Gulf which was over a mile to the surface, it took forever and we could control that. Here you are only at 100 feet. It will disperse so fast, we don't have enough ships, boats, anything to control that. There is no way of containing the oil. And then once it gets underneath the ice and the icebergs going through there, there is no way of cleaning up the icebergs. No one has ever tried or any studies on that, either.

Let's see. We need some studies done on oil dispersants, the dangers of it, not to use the same ones that they used down there in the Gulf. Come to find out the oil companies that had the oil spill is the one who

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owned the oil dispersant company, and they just took a fine and just kept on using it, no matter what it did to the people, the nature, the shrimp, everybody.

And up here the plankton feeds the whales. Now, if that plankton [sic] destroys all the plankton, we were going to have a major problem here because all the whales will just die off because it's their calving grounds and there is no way of -- so we have to either put regulations not to use dispersants, find a way to clean up the oil spill without any dangerous chemicals for the environment. And find out how you can clean the bottom of the ice because it's just going to --

And the dispersal rate -- you know, it will disperse -- like one acre in the Gulf takes, you know, a few hours. Up here at 110 feet, you will have half a mile dispersal rate. So every hour it's miles and miles, where in the Gulf you could control that. There is enough shift to be -- because it comes up in a small stream and it would be contained in one area. Here, that shallow, it just wipes out the whole -- there is not enough ships anywhere in Alaska to contain that much oil because it's so shallow.

Thank you.

DR. JIM KENDALL: Thank you, sir. Floor is yours. You have been waiting.

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MR. DELBERT REXFORD, SR.: Good evening. Good evening. Delbert Rexford, for the record. Before I provide testimony, I just want to thank those that spoke before me. And I respect their views, their comments and how they have articulated their concerns. I've got a different perspective coming from the corporate for-profit organization, such as Ukpeagvik Inupiat Corporation. And I will read verbatim the testimony prepared for Anthony Edwardsen who cannot be here tonight, and he expresses his apologies. But as we speak, he's in New Orleans conducting business, and that business is tomorrow hopefully at 9:00, the new vessel Ungalak that we built, we are hoping that it will be awarded the Work Boat of the Year by the work boat industry not only in the United States, but in the world.

Good evening. Thank you for the opportunity to provide comments on the Draft Second Supplemental to Lease Sale 193 Environmental Impact Statement. For the record, my name is Delbert J. Rexford, Sr., advisor to the President/CEO, Anthony E. Edwardsen. Mr. Edwardsen serves in the capacity of chairman of the Arctic Inupiat Offshore, LLC, or AIO. He also serves as the President and CEO Ukpeagvik Inupiat Corporation, or UIC. UIC is a for-profit corporation created under the Alaska Native Claims Settlement Act of 1971 with the purpose of

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providing economic benefits to its shareholders. UIC has 2,665 shareholders, most of whom reside in Barrow. UIC is a member of the Arctic Inupiat Offshore, LLC, which has made an investment in leases that were sold under the Chukchi Sea Lease Sale 193. UIC is unified with five other Arctic Slope village corporations and with our regional corporation and have a strong interest in the draft SEIS.

One thing the federal government failed to do when it sold leases in the Chukchi Lease Sale 193 was to deliver revenue sharing to those communities closest to the exploration, the development and future production of oil and gas reserves through federal impact funds. The National Petroleum Reserve Alaska impact -- mitigation impact fund program is a classic example of how federal revenues can and should be shared with affected communities in the like manner as revenues are shared with other coastal states in the continental Lower 48 states.

When the federal government held National Petroleum Reserve of Alaska oil and gas lease sales, the NPR-A mitigation grant program was created to provide for revenue sharing from the oil and gas lease sales which directly resulted in the deliverance of $10,462,965 in grant program funding to the impacted communities of Nuiqsut, Barrow, Atqasuk and Wainwright. Affected Alaskan

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communities have not received OCS federal revenues as a result of outer continental shelf lease sales. The long-term results of lease sale activities without revenue sharing will result in all risks taken entirely by affected Arctic slope communities within the Chukchi Sea, changes to our oceans and sustenance through drilling, but we would not receive a penny to support our communities' growth and socioeconomic impact needs as a result of future oil and gas activities.

This situation creates frustration and strong opposition to OCS activities within our communities. Let me justify that. I have previously served as regional tribal council member at large for Inupiat Community of the Arctic Slope and requested that a referendum be put on the ballot on where we stand on offshore issues. The vote was 50.6 against and 49.4 in support of oil and gas development. So you can see the close margin within the region for OCS development, which was a ballot measure within the regional tribal government.

This situation creates frustration and strong opposition to OCS activities within our communities. It's created a division within our culture in a place where we have to be good neighbors to survive together as a people. We were frustrated the federal government went forward with oil and gas activities despite the validity of our

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concerns for revenue sharing. We were provided a public process to attend public hearings and asked for input after the fact.

The separation and divide of our communities due to OCS activity created an opportunity for outside interests to prevail, to speak for us, to represent us and to use us as legal and political pawns domestically and internationally. There have been many lawsuits filed, and this draft SEIS is a result of such legal action by outside interests.

And as I stated earlier, I respect the comments that have been articulated regarding human health. There is also the other side of economic opportunities for those economically depressed communities that have multigenerations living in households without a job within a household.

As elected leaders, we decided to be proactive, to have a full and meaningful seat for oil and gas activities within the Chukchi Sea. Each time there is a lawsuit, projects, economic and employment opportunities are delayed for Arctic slope shareholders and their descendents as they are brought to a screeching halt, creating a delay with negative economic impacts and effects on our for-profit corporations.

We decided to take control of the outside rifts

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that separated our efforts to provide employment and economic opportunities for families that need jobs to feed and support their families on a daily basis. UIC joined with Nunamiut Corporation, Kaktovik Inupiat Corporation, Atqasuk Corporation, Olgoonik Corporation, and Tikigara Corporation, and our regional corporation, Arctic Slope Regional Corporation, to form the Arctic Inupiat Offshore, LLC. We needed to do this because OCS was going to happen and is becoming inevitable. We needed to capture and sustain economic real benefits, not just take all the risk as communities as OCS is developed and resources are delivered to market.

We did something we never contemplated before. In the 50 years of oil and gas activities on land, we never thought for a moment that we would buy into a lease sale interest. We bought an interest in the leases Shell owns. We bought and invested into the proposed OCS to be an active participant and a partner to protect and preserve our oceans, our renewable resources by getting a seat at the table with oil and gas industry to work with and guide them through the processes. So despite the fact of not having had the opportunity to have a vested interest in OCS activities through revenue sharing, we looked to the federal government to take into consideration our needs.

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Oil and gas property taxes is the major source of every infrastructure that is operating in all eight villages. And if we were to take -- turn the switch off, where would this revenue stream come from? I don't think we want to take that and jeopardize three billion dollars worth of infrastructure now or in the future.

We took it upon ourselves to engage in to have a seat at the table to guide Shell in its operations to assure responsible and sustainable development as a priority for our communities and environment within Arctic waters and our participation. This is very important for our shareholders and residents to understand.

We have the traditional knowledge and contemporary knowledge, expertise and ability to influence how future OCS programs will be operated as a partner with vested interests. And when they are successful, we, as the Arctic Inupiat Offshore, LLC, will also receive the rewards of our investment, passing it on to our shareholders through dividends, economic and employment opportunities, not only to today's generation, but to future generations. We must be actively engaged to assure our Inupiat ways of life are sustained now and into the distant future generations through responsible and sustainable oil and gas development. It is critical that we are at the table instead of being on the outside

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screaming and hollering till we are blue in the face.

Our comments on the Draft Second Supplemental for the Lease Sale 193 SEIS are very short. First, we have not been afforded the time to thoroughly review the draft document. Our comments is based on our investments and what we know may occur in the future in terms of OCS activity, economic employment activities, putting our workforce together for oil spill response and all the other vessels that are needed to protect our interest as subsistence hunters and users of the renewable resources within our garden. We understand the scope of the Draft SEIS is very narrow as defined by the Ninth Circuit Court of Appeals in its remand.

Thank you to the Borough of Ocean Energy Management for releasing the draft SEIS in a timely manner. Arctic Inupiat Offshore, LLC will be providing more extensive review comments on the Draft SEIS prior to the end of the public comment period which ends on December 22, 2014. We do ask BOEM maintain its schedule and not let it slip so that we can have a timely Record of Decision issued and hopefully close this matter about Lease Sale 193 for the mutual benefit of our nation, of our shareholders and our collective constituency that resides not only in our part of the region, but in other neighboring communities like Northwest Arctic Borough,

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Norton Sound and others that may benefit on a statewide basis from this activity.

Thank you for your time and attention on this critically important matter. As I stated, I respect the views and comments that have been articulated regarding human health and concerns for emissions or for concerns for cumulative impacts.

At a very tender age I was taught that prevention is equal to a pound of cure. Prevention at all levels is crucial and critical in all activities. Additional more detailed comments are forthcoming from our offices prior to the December 22, 2014 deadline date for comments.

I'd just like to hand the NPR-A Impact Mitigation Grant Program Report to the Second Session of the 27th Alaska Legislature on how we, the impacted and affected communities of Nuiqsut, Atqasuk, Barrow and Wainwright, expended those revenue sharing dollars. This is a good model to look at so that communities like Nuiqsut can get answers for emissions, human health. All these issues can be funded for these purposes. So I'd like to submit that as a supplement to my testimony on behalf of Anthony Edwardsen, President and CEO of Ukpeagvik Inupiat Corporation.

And I thank you for this opportunity. We know

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that this is a very sensitive matter not only to those that are here that are present, but all across each community that we serve and have the honor of serving day in and day out in one capacity or another. Thank you.

DR. JIM KENDALL: Thank you. The podium is empty.

MS. EDITH VORDERSTRASSE: It's not. I'm going to turn around because I would like to make a suggestion to you folks when you have these hearings. If you would turn the podium around so that whoever is giving testimony can see the audience. It's very uncomfortable trying to speak to an audience when you have your back to them. So that's my suggestion. I'm Edith Vorderstrasse, former resident of Barrow, but I currently live in Anchorage.

I first became involved in -- when someone approached me and asked me if I would become involved in working with one of our corporations in reference to offshore drilling. My answer to them at first when I went to my interview was, I said, no and hell no. And then two individuals came to me and asked me, okay, can you become involved in trying to help put protective measures in this area? I said, if you put it that way, I can. Because I was born and raised here in Barrow, I know how important our ocean is, I know how important our land, our rivers

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are. And we as community members -- I applaud each and every one of you for your opinions and for your concerns, just as I have. And I just want to encourage you to uphold Lease 193 because for the very reasons that Delbert spoke in reference to the benefits.

In prevention we as individuals are in control of our own health. And as children, sometimes they don't have the option. They are not in control when there is smoke, parents smoking cigarettes in their households, mothers smoking cigarettes when they are pregnant. These are some of the issues that we deal with. And it's not all from the industry. It's part -- part of it is, yes, I agree, Rosemary. I respect your opinion. I grew up smoke free. And I made sure my children grew up smoke free. But as they grew up, if they choose to smoke, that's their business. I've done my part.

But in order for us all to be involved in what is happening here -- and it's been very evident that it is coming. We have fought a fight to keep it from happening for many years because it is our -- our life source. It is our -- our table, as many people say it is. That's where we -- we receive our -- just the Thanksgiving feast that we have in our churches. We were blessed this fall. Last spring wasn't too great because of the ice conditions. And as Chairman Brower stated, fall whaling

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may be -- may become even a greater hunting season than what we currently see it as Barrow, Kaktovik, Nuiqsut, Point Lay and Wainwright have been hunting whales in the fall. Barrow has been blessed with two seasons, spring and fall. And that is our life source.

And one of the things that I tell people, project managers, when it comes to whaling, when this comes to our seasons, I always say, know your seasons. Know our seasons because I don't want you coming to me and telling me, my guys didn't come to work today. I said, what did I tell you? I told you, you make sure you have a group of people in line to come to work if no one begins to not show up because of our hunting. This is very important to all of us.

You know, I grew up, and I know when Rosemary moved to Nuiqsut, it was hard work trying to live in a small village like that. I lived as a child bringing in ice, bringing in snow. I remember waking up only once as a child to a cold house, and I'm one of those who are blessed because I just remember one time. My father was a hard worker, a great provider, and that is what he did for my family, our family. He made sure we were warm, we were fed, and he was a great hunter.

And when the Navy came here and brought natural gas out here first in 1964, this community was blessed

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with natural gas, and that's how we have heated our homes. That's how we have generated our electricity. I'm on the utility board. I have been involved with the utilities for many years and knowing villages spending thousands, hundreds and thousands of dollars just to bring in fuel to generate electricity and to heat their homes. That's tremendous. And what we pay right here in Barrow is awesome. Our utility bills for my household for water, gas and electricity is about $354. That's for three utilities. That's probably double in some of these villages for heating.

And we all enjoy the lifestyle that we live, not having -- you know, it used to take me all day to do laundry because we took turns doing chores on weekends. First beginning of the week we had to bring in the snow to 55-gallon drums. And what makes me upset is when mothers get upset at their children for coming in with dirty pants or wet imaaktaq. And I just say, what's your beef? All you have to do is stick it in the washer and throw it in the dryer. You don't have to melt snow or use a wringer washer. These are things that we have endured. And this younger generation does not understand that.

Even honey buckets. In fact, someone on the airplane was asking me if we still have honey buckets. I said, yes, there are still some who have honey buckets.

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My daughter was four when we moved to Juneau for me to work with the late Representative Maclean. When we came back my husband had installed our flush toilet. And as our daughter grew older, we went to Anaktuvik to visit her grandmother and went to a graduation there, and she said, Mom, Grandma has a honey bucket. Where am I going to go? And I laughed and I said, the honey bucket. If that's not good enough for you, I said, you can run to the school and use the toilet there. These are things that we have grown up with.

And you know, some people say we want to live the way we used to live. I certainly don't. I really don't wish -- even living in Anchorage and not using natural gas to cook on is the pits, but that's -- that's Anchorage. Where I live I don't have a gas stove that I can just turn on. I came home here for Thanksgiving, and I love turning on that stove because it's instant heat, and you can turn it off and it's off.

So I just want to thank you folks for coming, taking testimony and listening to the people who have requested you to do this. It's been a long road for all of us. And it's inevitable that it's going to happen, so -- but I want to make sure that corrective measures are made. That's why I became involved so that we can work with the industry to try to make sure corrective measures

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are in -- in the EISs, in the impacts.

And as Chairman Brower stated, work with us. Convince -- keep working with the industry to say work with the Conflict Avoidance Agreement. That's a very important agreement. And that's something that we need to work with. And I really don't appreciate some of the industry groups who have chose not to -- not to comply by it. It really gives me disheartening. And in the work that I do, I try to convince them. And I say, this is a good program. If you want to be involved, get involved in this. Sign the CAA. Whether in the Beaufort or in the Chukchi, that's something that is in place, and I really -- I will stress, along with Harry and Robert, that this is something that you as BOEM need to take into consideration when these leases are happening. We need our protective measures.

And I -- I drive a Prius in Anchorage, and people flick me crap about driving a Prius, but you know what? I enjoy it. We as individuals need to do our part in conservation, in trying to make sure that our children will be able to enjoy and our grandchildren what we have enjoyed. But we have to take part in it. And I told the young lady out there they said, are you going to testify. I said no. So she can change my N to a yes.

But I want to thank you for coming. And it's

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something that we as individuals -- for myself, I know I wouldn't -- wouldn't want my children to go back to the way I lived when I was a child. I had lots of fun. I did not -- we did not need entertainment. We didn't need computers or all the things that our children are addicted to. And I get crap for leaving my cell phone at home sometimes, and I just say, you know what, sometimes I just like to be disconnected.

So thank you.

DR. JIM KENDALL: Thank you very much.

MR. CRAIG GEORGE: That's a tough act to follow.

DR. JIM KENDALL: Edith, we liked your comment. If people want to come and face the crowd, that's fine. It's just good if Mary can see your face while she's typing. That would be a big help. So if you want to stand here and face the crowd, that's fine.

MR. CRAIG GEORGE: Thank you. For the record, my name is Craig George. And as usual, I'm going to make some very bowhead-centric comments on this. I've studied bowheads for over 35 years here. And anyway, so a few specific things on the draft. First a compliment: Page 88, the literature is current. That isn't typically the case. You used the Quakenbush, Citta, et al. telemetry data this time. That's good. That was admitted

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in one of the last drafts. The estimate is correct. The current estimate is 16,982. And the gentleman who computed the estimate is sitting in the back of the room, Geof Givens. So if you have any questions about the statistical methods, there is your man. You may not understand it, but there he is.

Page 277, I think you are correct in identifying a spill in the spring lead as a catastrophe. That is something we heard comments from a number of people that that is something that absolutely can't happen or you have got to prevent, rather.

Page 278, the analysis was interesting in that ship strikes are considered a lot problem. I agree, based on the experience of North Atlantic right whales in the northeast coast. Bowhead's ugly cousin, as they are sometimes referred to. They have a lot of problem with ship strikes. And I think you are right; as ship traffic increases, that will -- that incidence will increase. However, right now it's low. I think we only have about six animals with evidence of scarring from ship props and that sort of thing out of maybe 500 animals examined. But nonetheless, I think that is an issue. But the analysis suggested that the ship strikes would be a bigger problem or source of mortality than oil spills. That's page 278. That seems speculative.

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I would think that for a number of reasons, if I understood this right -- but for a number of reasons I think higher mortality rate would probably come from a spill and probably from baleen fouling. It probably will be one of the -- probably one of the things that really leads to energetic problems with the animal, that sort of thing.

And in that regard, I would suggest more analysis of that particular problem, baleen fouling and, I don't know, studies or -- there has been some work done, but I don't think it's necessarily the best study design on that.

Page 328, in reference to effects to subsistence from various activities, I think that's a good place to cite that there is new evidence that, of course, the hunters have told us for years and years that bowheads can smell. And we have worked with very good anatomists here and, you know, identified olfactory bulbs in bowheads. Anyway, there is a published paper that is pretty much a slam dunk that bowheads are pretty much capable of detecting odor in air as they breathe it in. So the point here is that that could affect the ability of hunters to capture bowheads.

DR. JIM KENDALL: So we don't have the paper in there?

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MR. CRAIG GEORGE: Well, it wasn't cited there. So just take a look. Again, I wasn't studying this all day, but -- I didn't see it cited there.

And just as an interesting aside, the little local knowledge that back in the day when we used to burn at the dump, remember all burning ceased in the spring during whaling because of the prevailing wind that came from here, the smoke plume went offshore, the hunters said that's going to deflect the whales. So we shut down -- it was always shut down and then it was resumed after the hunt.

And now the philosophical part. Part of the Givens analysis, the work that we have done actually for a number of years, but the most recent analysis, there is a trend analysis that indicates that bowheads are doing -- still increasing. There is no evidence of density-dependent effects. They don't seem to be slowing down or reaching carrying capacity, and there is a couple reasons for that -- probably a lot of reasons -- but one of them is clearly -- the reason the stock is doing extremely well is because the habitat is in such good shape. Very little industrialization of the bowhead habitat, but save human impacts. And unlike whales elsewhere that are struggling in some populations, at least, they are doing well. And I think you have heard a

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lot of comments tonight that -- that they want to maintain that. So -- keep things as pristine as possible. And then there are some other philosophical points here. But I think that's it.

One final comment, I guess, is I think there is a lot of -- makes a lot of sense to move slowly in offshore oil and gas. It's sort of an experiment, in a way. We can try and predict effects. We are not going to get them all. So move slowly. If you move a structure out there, monitor it heavily and make sure your predictions are right. Then perhaps you can add another. There probably is a threshold there. If you get enough hardware out there, you are going to deflect migrations and this sort of thing or, you know -- so I urge a very cautious, stick-your-toe-in-the-water type approach.

And that's it. Thank you.

DR. JIM KENDALL: Thank you. Very good. We have an empty podium and it's facing in a good direction. We can all see and we can all hear.

MR. BILL TRACEY: Good evening. Thanks for some of you coming back, and welcome to you folks that haven't been here before. Hi, audience. Bill Tracey, for the record. I testified here before. We may have been in another building, but kind of an update, if you will. And I'm kind of a storyteller. I have a bunch of grandkids,

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and they like to hear about the old times. And for me, the old times is 40 years ago or so when I moved up here. I may have been born on the East Coast, but I believe I was reborn here on the North Slope.

I had two wonderful stepparents, Warren and Dorcus Neakok, and that's where my story kind of begins. I had the pleasure, the opportunity and the family that allowed me to take them on a snowmachining sled ride out to the edge of the ice west of Point Lay. This is probably 1975. And it was good, strong ice. It was thick, a lot of pressure ridges, so the trail was kind of mixed. And it's -- it's pushing breakup time of the year. So there was a lot of fog around. Few airplanes back then. We were lucky to see one or two airplanes a month. And those were charters by ASRC bringing in our mail. So if somebody came to Barrow for medical or business, you may be here for the entire month before you got back home, unless there was a charter.

So anyway, I'm taking Mom and Dad out. They wanted to go snow goose hunting, seal hunting if they could. And it just seemed like we were heading west out towards the open water for hours and hours and hours. We probably were because we were probably 15 to 20 miles out. You couldn't see Point Lay anymore. You couldn't see the Brooks Range anymore. We were just out. Everything was

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just white.

And it was a good day. We set up camp first. The geese were flying. A bunch of them ended up on my sled. It was a successful hunt that day, so we had what we went out there for. And it started getting foggy. And I did mention that this is breakup, and if we got caught between the water flooding the lagoon and our village, then we were caught for a while and we would have to make camp somewhere. So mom knew the importance and, of course, dad wasn't saying much. Mom did all the talking. And she said, it's time to go. And I look at where we came from and, yeah, I can see my trail for about 15 feet, but then the fog obscured it. So I say, okay, we are going. I kept looking back at Mom, and she would point over there, so I'd go that way. And all of a sudden I'd lose my way, and I'd look back, and she'd point over there, so I'd go that way.

To make a long story short. Mom directed us back home. And the two rivers, the water from the two rivers during breakup almost met. We made our way between the waters, we were home. Thank you very much.

Mom directed us home, and I like to think that, God bless her soul, and Warren, that that's why I'm here tonight. I was directed by her to be here tonight to once again speak to you folks about change up here. Things are

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really changing. Back then in '75 we would see icebergs the size of Barrow. They were so big, they had their own weather. It was phenomenal. I didn't own a camera back there, but boy, I wish I did. I think I had one of those little 110s. I don't think those are real pictures, but --

But the memories. And I could pass on these memories and stories. These icebergs were so big they had their own weather. They had their own ecosystem, if you will. And they just went on forever and ever. If you tried to drive around this iceberg, you would end up in Wainwright at one end and Point Hope at the other. I'm exaggerating, but it was big. We -- actually, Marie and I, my wife and I, would kind of look at each other and say, I think we're going a little too far, so we would turn back. But there was arches, water was dripping on us. It was just amazing. You don't see icebergs like that anymore. Maybe in the Antarctic.

So that's changed. We have got very young ice now. And it takes forever for the ocean to freeze in the winter now. You will notice that we still have a lot of open water. And a little blow or a little current and that ice is gone, too. So that's a change.

We have had a lot of studies here since then. Caribou have been studied. Loons have been studied.

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These are studies that I've witnessed. Belugas have been studied, bowheads, walrus, seals. And not all studies are treated equal. Some use helicopters, and they really disturb the animals. Some use high-flying airplanes. A little better, but I think even at 2,000 feet animals and people can still hear these airplanes and they are disturbed.

It was mentioned earlier that an animal in their element like a walrus in the ocean isn't that disturbed by an airplane or by a boat unless you are hunting them, of course. But when you put a walrus on land, it's a different animal, very nervous animal, very stressed animal. And we have seen some signs of stress. We talked about stress earlier tonight. These walruses were stressed. They were showing lesions on their skin. They had breathing problems. And the last couple of years during the last couple of haul-outs, they seemed to be a little better, a little healthier. So are they getting used to hauling out on land? I don't know.

But I tell you what we did one year in Point Lay. It was one of the first years that the walruses had to haul out because they didn't have their summer ice, which would have kept these walruses out at the Hannah Shoal area. That ice wasn't there anymore, so they started hauling out and they were hauling out close to

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Point Lay. I think they tried to haul out near Wainwright. But between the hunters, there is a lot of folks in Wainwright, not so many in Point Lay. So I think between the hunters and the distance to where they feed, they find it more convenient and less distracting in Point Lay.

But the Point Lay folks treated this haul-out like an incident. And I know all about incident command, being in the fire business, so I'm right there in the front lines with them. With the help from the North Slope Borough Wildlife and our community councils, a couple of folks, big effort, we convinced FAA to divert air traffic so they wouldn't be flying over these herds of walrus.

We talked to our hunters, and they were agreeable to hunt on the fringes rather than the big pack because any little disturbance caused a stampede, and these walruses made their way back into the ocean when there was -- they were so close to Point Lay a dog barking would make them nervous. A boat going by made them nervous or made them stampede. A brown bear, an airplane. Everything made them nervous. Not so in the water. I wonder in the water, they are a little more fearless. They can get away. But one of the ugliest things I've ever witnessed in my life is a walrus stampede where one year we counted over 100 juvenile dead walruses from

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suffocation from these stampedes.

My wife Marie and I, we feel blessed that we got to observe walrus haul-outs, the last five haul-outs. And I think Delbert mentioned to me one time that he's aware of a haul-out 50 years ago or so. It happened. I hadn't ever seen one in the 40 years I was in Point Lay up until I think it was like 2009 -- so Marie and I crossed the lagoon and parked our boat and crawled almost a mile up to the walrus just so we didn't scare them. We were in Carhartts. We didn't shower. We didn't have aftershave or anything on. We were trying to blend in. And we got to see walrus that were unaware of us or didn't care, didn't think that we were a threat and had a wonderful two days -- we set up camp and just observed and took pictures.

Now I have a camera and took a lot of pictures. As a matter of act, maybe one of the pictures tonight is one of mine in that presentation. These animals weren't scared of us because we didn't pose a threat because the airplanes weren't flying over. They weren't nervous from that because they weren't being hunted in their big group. A lot of things fell into place, and we made it as easy as possible for the walruses to haul out.

Belugas, Wildlife here, North Slope Borough Wildlife has done a wonderful job studying belugas. I've

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seen belugas, how they act when they are being hunted. I observe them when they are being hunted by man and when they are being hunted by killer whales. Their survival instincts kick in. Very powerful animals, very family-oriented animals. And like it was mentioned earlier tonight, we think they come from the deep rather than up the coast. If they didn't have that deepness to come from, where would they go? These are creatures of habit. We take away what they know, will they survive the unknown? Don't know.

So these are things that really have to be understood, studied, if you will, from afar. The more passive the study, I think the truer understanding you are going to get of an animal. When I observed a loon study, these folks set up camp so that they weren't boating in or flying in. There was little movement. So these loons grew accustomed to them, and they got a true sense of what the loon was like in its natural habitat.

So try to tell this to industry and they will do their studies with their helicopters. They will come flying in. And now they are not studying a natural setting. They are studying scared caribou, one that's running. It's funny; we would see caribou all day long, and the folks that were trying to study them said, we didn't see any caribou today. I wonder why.

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So these are things that you need to pass on to folks that want to be up here. And it's alien to the folks down south. There are some here money driven. There are some here because they want to be. And there are some here because they were born here and they love this place and they want to keep it as pristine as possible.

Just imagine this. This is -- the Arctic Ocean on a summer day, not a cloud in the sky, the sun straight above, the ocean is like a mirror. You are on your boat ten miles, 20 miles offshore. You have got walruses in one area. You have got belugas in another area. You have got birds flying above. And then all of a sudden your boat is picked up out of the water. Marie and I and my son when he was two years old were just adrift having lunch, and all of a sudden our boat was picked up out of the water. And as gently as we went up, it was brought back down. And it was a gray whale. Didn't see it coming. Quite surprised at the -- it did that without tipping us. And I looked at Marie and she looked at me and I said, Marie, do you think we are in their path? And so we moved a little bit, but there was whales everywhere, so it didn't matter where we were. I think the gray whale thought we were a piece of ice and it was going to scratch its back. That's an animal in its natural habitat doing

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what they do without a care in the world.
And I think the folks that have been living up here for thousands of years understand this better than I could ever tell you, better maybe than they could ever tell you. You just have to observe. You have to spend some time and just see how things are, and you can imagine how things were. You are nomadic. So we have talked about seasons. There is not only seasons, but there is places that you want to be at these different seasons. I don't think the ships out in the ocean understand this. I don't think -- industry has been up here for a long time. I still don't think they get it because of some of the things they do. And I think if they would listen more, if they absorbed some of that traditional knowledge, then maybe they would get it. And we could co-exist and we could do some responsible drilling up here.
And I know technology is -- is on the fast track. Well, so is climate -- climate change. We are noticing some permafrost melting quite fast in some of our communities. We build our houses on stilts on pilings, and some of these pilings are exposed all the way to their nine- and ten- and 12-foot depths. And we are putting cribbing on some of these houses so our water/sewers that are a direct barrier coming up out of the ground are bending and breaking.

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So what was -- if you are working off old information from previous studies, maybe that is irrelevant today and you need to stick with the times. Things are changing, and it's on the fast track. And it's not just down here. We have got changes with wind directions, with current directions, the depth of ocean, the salinity of the ocean, the air we breathe. Everything is changing all at once. So when you talk about cumulative impacts, you have got to include all the natural and unnatural stuff that's happening all around us.
Remember, this is the top of the world. Some of the -- who was it -- President Reagan talked about trickle-down economics. Just be careful because this is the top, and everything that happens here is going to come down the rest of the world. So be kind to this area and it should be kind to you.
Thank you.
DR. JIM KENDALL: Thank you.
MR. MICHAEL HALLER: Bill, that was your photo. It is your photo. Thank you.
DR. JIM KENDALL: I'm seeing tired eyes in the audience.
MR. DELBERT REXFORD, SR.: We don't get tired of stories like that. No, we don't.

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DR. JIM KENDALL: Does anyone have anything else they would like to add to the record?
MR. DELBERT REXFORD, SR.: I'd like to speak as an Inupiat, too. Delbert Rexford, for the record. I'm speaking as an individual. I'm a whaling captain. I've prepared many speeches for my father when he was the chairman of the Alaska Eskimo Whaling Commission. We would spend numerous hours after his trips internationally as he fought for our way of life to sustain our whaling culture. As a child growing up, I learned how to read with a single lamp. I wasn't as fortunate as some other families were. But I love to read and I love to write. And that inspired me because going to school was something I could look forward to. But even then we had honey buckets. We had wooden seats. Sometimes we would get splinters. Those were BIA seats. They were. And you could smell the human waste when the building got warm.
[indiscernible] would put ice in the -- and start melting ice before lunchtime and start delivering water to each classroom. These are the things that we grew up with. I grew up with taking care of my dad's nine dogs. When he went on a union job, I was responsible for those dogs. Springtime was a mess. We had to clean up a lot of poop.

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But the point is this: To every season we adapted. To every opportunity we adapted. And then we embraced those opportunities to learn from each unique experience. As Bill was talking about the icebergs, my father and I were rescued by North Slope Borough rescue. He took me approximately 150 miles straight out to the ocean. We had two barrels of fuel. He said, I need you to see what is out here. I saw animals I had never seen in my life, the size of the animals. And then I couldn't believe that you could shallow out in the middle of the ocean. I couldn't believe that. And he would tell me stories about being out in the launch boats for a week at a time out in the ocean hunting.
On our way back we got caught. The ice had come in, icebergs twice as high as the ASRC building, moving fast. My father had an illness where he had ulcers and he would get weak but, you know, when you are in survival mode you do everything that you possibly can do. And as he became handicapped briefly, I did everything that he possibly knew that I had to do.
But the point is well taken, that it is -- when -- when he told me, one day you will understand when I say first and foremost as a whaling captain, I am responsible for the lives of those that I have the pleasure of being a captain for.

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And this is where we are today, each one of us. We are on a ship, different ships. Yes, there are human rights issues. When I spoke at the United Nations Summit in Copenhagen on human rights issues and subgovernance, it was because we as Inupiat people were not recognized within that international arena as indigenous peoples. We were only recognized at the domestic level.

I envision my grandson, who is 13 months old now, as we look at the 77-year calendar, becoming an old man at that time and the impacts, whether cumulative or otherwise, he will live those. Point Hope is very strong about opposing offshore, but I know that my son who is an accomplished hunter will teach him what is right and what is wrong regarding conservation, cultural, survival, and the importance of our values.

One young lady asked how much is a life worth. My father told me that there is no price on human life. But there is a price on what you can do to better it. And that price might be a little sacrifice to adapt to a change -- to change and to create opportunities for the betterment of those we serve. For the 13 years he served at the AEWC, he would cry sometimes after coming from the international and say, they want to take our whaling away.

Robert, Greg and those that are still fighting the fight, my hat goes out to you because, believe it or

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not, he loved you guys for being there for him. And we are going to adapt.

As I stated earlier, an ounce of prevention equals a pound of cure. I've worked with the industry in Prudhoe Bay. I've worked in remote sites. Safety first. But it takes a Hazelwood under the influence of alcohol and human error to cause a catastrophe. We all know that's what happened, which is why we as Arctic Inupiat Offshore are very adamant, safety first, prevention and involving the Inupiat community all across the North Slope so that we are at the table, and then we are not outside that window and looking in and saying, hey, listen to us. We want to be at the forefront.

I respect Rosemary. I respect those that have articulated and passionately shared with us tonight because it is lives at stake. It is cumulative impacts. Now the question that we must ask ourselves is: Are we willing to go to the forefront and say what can we do to mitigate, to reduce impacts and to make it better? And that's a challenge that we are going to be faced with. Even my son is going to be faced with that.

But I thank you. I have been touched tonight. I have. It tells me that I need to -- need to even work harder on prevention, being prepared, because an ounce of prevention, as my father stated when I was a little boy,

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equals a pound of cure. It's going to take 16 times my effort to clean your mess up. But if you prevent it, you don't have to clean it up.

And I'd like to end on a light note. The -- back when they used to deliver mail once a month to the -- to the villages, the pilot would go to John in Wainwright and say what's the weather going to be like, John -- I mean, the pilot's name was John. He would go to the old man. He would stick his finger out all four ways and tell the pilot exactly like that weather time and time again. But one day he comes back. What is the weather going to be like? So he does his little ritual, puts head down and says, I don't know, John. My radio broke down.

DR. JIM KENDALL: Thank you. Well, that took us after 10:00 when we are technically supposed to end. But does anyone else like to add anything before we close out the evening? This has been -- this is probably one of the best meetings we have ever had. We have had great comments, good engagement. This is the kind of stuff we needed to help make this document better from everybody's comments. It was great.

MS. ROSEMARY AHTUANGARUAK: I would like to add a couple things.

DR. JIM KENDALL: Absolutely. Come on up.

MS. ROSEMARY AHTUANGARUAK: The one big

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thing that I feel is missing out of this process is that this process must go forward in a precautionary process. And that's our biggest concern because some of these discussions are not about precaution, and reality is that we are going to live through those risks. And I also wanted to bring in support around the discussions with the dispersants. We have immediate threats with the preauthorization of dispersants. And some of our animals are very old, and the cumulative effects of them coming through their great migration distances makes it very difficult for us to assess for any areas of their migration where dispersants may be used. We cannot adequately track it and look at this information. So there has to be improvements to transparency of all of this process so that we can look at the information wherever it is being done to look at the risk for the health of us and our future generations. And that's mandatory for this process going forward.

Thank you.

DR. JIM KENDALL: Thank you, got it. Anyone else? Well, with that, I would like to officially close this public hearing. And thank you all for coming. I think we can end the record here.

(Proceedings adjourned at 10:07 p.m.)

REPORTER'S CERTIFICATE

I, MARY A. VAVRIK, RMR, Notary Public in and for the State of Alaska do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that the proceedings were reported stenographically by me and later transcribed under my direction by computer transcription; that the foregoing is a true record of the proceedings taken at that time; and that I am not a party to nor have I any interest in the outcome of the action herein contained.

IN WITNESS WHEREOF, I have hereunto subscribed my hand and affixed my seal this _____ day of December 2014.

_____
MARY A. VAVRIK,
Registered Merit Reporter
Notary Public for Alaska

My Commission Expires: November 5, 2016

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BE IT KNOWN that the aforementioned proceedings were taken at the time and place duly noted on the title page, before Mary A. Vavrik, Registered Merit Reporter and Notary Public within and for the State of Alaska.

P-R-O-C-E-E-D-I-N-G-S

DR. JIM KENDALL: Welcome. We are starting a few minutes late. We advertised this in the paper three days in a

row. We sent out notes to all our constituents. Mike, I think we were on the radio.

MR. MICHAEL HALLER: Right.

DR. JIM KENDALL: Last time we did something like this, we had somewhere between 60 to 70 people. We were afraid we had too small a room here. But anyway, let's just proceed.

Some of you know me. Jim Kendall. I'm the Regional Director for the Bureau of Ocean Energy Management. It's a federal agency or a bureau within the Department of Interior. Some folks asked what oil company are you? We don't work for an oil company. We don't work for the State. We don't work for an NGO. We try to be a very unbiased, transparent organization that provides the information to the decisionmaker. And in this case the decisionmaker is the Secretary of the Interior. So the document we are working on with some of our friends, know that this is not a decision document. It's a document of information that goes to the decisionmaker who in this case is the Secretary of the Interior.

We may liven this up a little bit. Anyway to introduce the folks here, we have --

MS. BETTY LAU: I'm Betty Lau. I'm the Chief of Resource and Economic Evaluation section in BOEM in Anchorage.

MR. MICHAEL HALLER: I'm Michael Haller, the tribal and community liaison for the bureau in Alaska.

MR. MIKE ROUTHIER: Mike Routhier, program analysis officer.

DR. JIM KENDALL: In that corner right there is the second most important person in the room. The most important people in the room are the ones sitting in the audience. The second most important person is Mary Vavrik who is our court reporter. She takes down everything. And if you are like me and a Yankee, you have got to slow it down so she can get all the information. State your name, right, and then if you have any notes that you are speaking from that you wouldn't mind giving to Mary so we can QA and QC the record, that would be great. So Mary is very, very important.

We also have a couple people out there. We have got Deanna Benedetti. Hi, Deanna. She's sitting out there taking names and stuff. We've got Heather Blood. They are from my office. They are helping out with the meetings.

And unlike some of our public hearings, we are doing this one a little bit different. I think we all know this, especially those of us that are feds, that most people don't spend their evenings reading EISs or tracking EISs or going to public hearings. They actually have

lives. So what we are trying to do is give people who are not that familiar with the topic what this is all about, why it's important, and why we do this.

Now, the simple reason of why we do this is because there is a law, the Outer Continental Shelf Lands Act, that Mike is going to touch on that tells us we will do this and the Secretary of the Interior is held responsible for it. So basically this is us doing our job, and that is to get input from the taxpayer, our bosses, into this document that goes to the Secretary so she can make a decision.

Then after we have a nice presentation here, then we go to the public comment period. And usually we try to keep it to three minutes a person when we have people flowing out the doors. So if you happen to run over your three minutes, that's fine, too. We also went to a lottery system for some of the very larger venues so that people that -- felt it was fair. There wasn't blocks of people coming in and monopolizing this. So we went to a lottery system. I don't think we need to do that tonight. We can just go around the room. And if anybody wants to gets up and speak, some people call it testimony; we call it public comment. We will do that. Again, any notes go to Mary. Make sure she can hear you. State your name.

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And with that, Mike and Betty, dazzle us.

MR. MIKE ROUTHIER: No promises. All right. Thank you, Jim. As Jim stated, we are the Bureau of Ocean Energy Management. We're here to talk about this document in particular. It has a very long title: Chukchi Sea OCS Oil and Gas Lease Sale 193 Draft Second SEIS. And the SEIS stands for Supplemental Environmental Impact Statement. It's a NEPA document, an environmental review document.

BOEM is a federal agency within the Department of the Interior. And as Jim stated, we are here to talk about this document we prepared and also get your comments on that document. That's the critical goal here.

BOEM's primary responsibilities are to manage the development of energy and mineral resources on the Outer Continental Shelf. In Alaska that's from three miles to 200 miles out in the ocean. And our mission is to do that in an environmentally and economically responsible way.

Our program has several facets. We implement a five-year oil and gas leasing program. That's the stage at which the agency looks at various portions of the OCS around the country and determines which of those areas might be suitable for lease. Once leases are issued in a given area, lessees may wish to submit exploration plans

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or development and production plans. And our agency would review those, do an environmental review and also apply certain regulatory standards prior to potential approval. I touched on the environmental review function.

There is also a robust environmental studies aspect of our program funding millions of dollars' worth of research, including in the Chukchi Sea. The agency also conducts many resource evaluation functions designed to assess the extent of oil and gas resources on the OCS.

These functions take place in the context of a four-stage process. That process is designed by the Outer Continental Shelf Lands Act, as Jim mentioned. It starts off with that broad five-year program. It goes down to individual lease sales. From there you could have exploration plans and if a discovery is made and the company is interested in pursuing development and production, they can submit a plan for our review.

Here we are at the second stage, although it's kind of an unusual circumstance in that Lease Sale 193 has already been held, and we will give you more information about that.

Background information on Lease Sale 193. In 2007 the agency released a Final Environmental Impact Statement, or EIS, to assess the potential environmental effects of leasing in the Chukchi Sea. In 2008 Lease Sale

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193 was held. The government received high bids of nearly 2.7 billion dollars and issued 487 leases in the Chukchi Sea.

A couple years later as a result of litigation, the agency prepared a Supplemental Environmental Impact Statement. That was in response to a District Court remand, U.S. District Court for the District of Alaska. As a result of that remand, the agency prepared a supplemental EIS, went back to the Court, the Court found that the agency did its job, dismissed the case. However, plaintiffs in that case appealed to the Ninth Circuit Court of Appeals.

The appeal raised two issues. The first was a missing information issue that had been previously litigated, but the Court of Appeals found that the agency properly handled this missing or incomplete information in the context of the EIS and the Supplemental EIS.

The second issue pertained to the exploration and development scenario upon which the 2007 document was based. There the SEIS analyzed a one-billion-barrel exploration and development scenario. And the one-billion-barrel scenario represented what the agency thought was a minimum amount of production that would justify a company investing and developing the resource. And that was done in the context of historical background

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in the Chukchi Sea, which is a frontier area where there is currently no existing infrastructure and there have been no economic discoveries to date.

However, the Court of Appeals identified a deficiency with the 2007 SEIS. They did not like the fact that the EIS was based on that one-billion-barrel production scenario because the document acknowledged that should that first billion-barrel field be developed, then more development and production was reasonably foreseeable, but the document didn't analyze the effects of that additional development and production. The Court of Appeals found that was a deficiency and remanded the matter back to the District Court and then back to the agency.

So BOEM is now correcting this deficiency by preparing a Supplemental Environmental Impact Statement, more environmental review this time of a greater level of development and production, 4.3 billion barrels as opposed to the original one billion barrels.

So developing this SEIS is a big effort. We understood that in order to produce a good document we should bring in other government agencies, government entities with expertise in this area. To that end we invited several of those entities to be cooperating agencies. Many of these agencies accepted. Those include

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Bureau of Safety and Environmental Enforcement, our sister agency that does enforcement and inspection functions on the Outer Continental Shelf; Bureau of Land Management, BLM; State of Alaska and also the North Slope Borough and the Northwest Arctic Borough. While not cooperating agencies, which is a term of art under NEPA, we have several other agencies that we call participating agencies because they helped us prepare the document. Those include EPA, Fish & Wildlife Service, NMFS and the Coast Guard.

The heart of any NEPA document is the analysis of alternatives. Here the SEIS analyzes four alternatives. It's the same four alternatives that were analyzed in the 2007 document, as well as the 2011 document. It has a proposed action, a No-Action Alternative, and then it also analyzes two corridors along the coast of the Chukchi Sea of varying sizes. And selection of those alternatives would mean no leases in those areas. And you can see in the figure on the screen where the existing leases are in the Chukchi Sea relative to the coastline.

Something that's very important to understand is that no new areas would be offered for lease through this process. The agency is not looking at issuing any new leases through Sale 193 or through this document. The

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issue really is for the Secretary to decide whether to affirm the existing leases, to modify the lease sale in some manner or to vacate or get rid of the leases.

I mentioned earlier that the exploration and development scenario is a key issue in any leasing documents, but especially here where it's a matter of litigation. And it was Betty's group that helped create or created the exploration and development scenario we analyzed in this document, so I'm going to turn it over to Betty.

MS. BETTY LAU: Thanks, Mike. And as Mike said, the issue that the Court found with the previous document was the one-billion-barrel scenario for the oil production, when it was stated that, yes, more could be reasonably foreseeable, but a number wasn't put on that and it wasn't analyzed for the environmental impacts that could result from it, so our first job was to quantify how much more.

And then once we understood we had a number how much more, then we created a scenario, which is our idea of how, if you were going to produce 4.3 billion barrels, what would you have to do? How many wells do you need? How many platforms do you need? How long would it take? How would you -- how would you build that infrastructure in? You have to make some assumptions. You have to make

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a lot of assumptions about how the production is going to be produced and how it would be transported. Obviously, you know, different people with the same numbers would come up with a different idea of it.

But the first thing was to get our volume. And this is a chart of how -- how we think about it. What do we consider when we are trying to come up with how much oil could be reasonably anticipated from a single lease sale? And in this case, which was unusual, we already knew what was going to be leased because we are only talking about the existing leases. Normally this analysis happens before a lease sale when you have an area open for leasing, but you don't know which ones will be bid on and which bids will be accepted. So our whole process, we took it right back to the very beginning and worked through the process from the very beginning.

Now, in all of the Chukchi Sea, the entire area of the Chukchi Sea planning area, we think there might be about 8,500 prospects. Now, a prospect is an area that someone might be interested in drilling, not necessarily that it would be productive, but maybe someone would want to drill in that. And we don't have good seismic data for all of the Chukchi Sea, so a lot of the number is kind of extrapolating from what we do know and saying, well, if this trend continued out here and the geologists and the

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geophysicists look at it and they come up with a number that they think might be reasonable, but from there we look at the undiscovered technically recoverable resources.

Now, undiscovered is a very important part of that. This isn't anything we can measure. We don't know where they might be, but the question is, how much of that -- those 8,500 prospects, how much of that do we think we could actually recover using the technology we have available to us right now? Nothing exotic, nothing that would have to be developed, just what we already know, what could we -- what could we get out of -- and again, we are talking about the entire area of the Chukchi planning area.

So from there we go from 8,500 prospects to 1,400 pools and 15.4 billion barrels, the first time we have a volume. Now, that's the oil we think might be technically recoverable from the entire area if money doesn't matter.

But, oil companies don't think that way. They -- they are in business to do business. So we have to then analyze the economic effect of that, what would happen at different prices for oil. If the price of oil is this, how much would you get. That's changeable, then. Every time you change the price of oil, it's going to

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change this next volume. And that is the undiscovered still economically recoverable resource. When you look at that, you are now down to 80 pools and you have 11.5 billion barrels at $110 a barrel. And that's what the price was hovering around last summer when we did this analysis. Now it is not, but you have to -- you have to pick a number, and you understand it's going to change.

So then we take -- now we are talking about the whole Chukchi. What do we think might be reasonably anticipated as a result of this sale? Now, we have, first of all, the things that might be drilled as -- as a direct result of this sale, but then what if there were a success? What if somebody hit something good? Well, then, they would probably request that there be another sale later. And what if they find something in that sale?

So we are looking at not just the result of 193, but one additional sale. And when you look at that, you get 6.4 billion barrels. And then the volume that we finally come down to as a direct result of 193, if you had one large anchor field, which is a field that would stand alone economically, if they found that field, nothing else, you would still develop that field and then one satellite field, which is a smaller field, which may not be economic on its own but that could use some of the infrastructure from that anchor field. So it has to be

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close enough that you could tie into the pipelines. You would use the same shore infrastructure.

So doing that, that's where we come up with our 4.3 billion barrels. It's kind of a painful process. And it's pretty complicated, but I think that kind of gives you an idea of the thought process that we went through and how we got the volumes.

So here are some of the assumptions that we make is that we have one big field that would be our stand-alone field of 2.9 billion barrels and one satellite field of 1.4 billion barrels, total 4.3. And the associated gas with those two fields would be 2.2 trillion cubic feet of gas.

Now, because there is no way to get natural gas from the North Slope at this time down to southern Alaska or some sort of sales point -- we don't have a pipeline yet -- we are assuming that when the oil, the gas and the water come out of the ground together, that you would take the gas and the water and put them back into the reservoir at first to maintain the reservoir pressure and improve your oil production, which is what they are doing at Prudhoe right now.

And then after there is a pipeline from the North Slope to southern Alaska to some sort of sales point, and it's been in use long enough that it would have

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capacity and the oil starts to deplete from this anchor field and satellite field, then you would start producing the gas for sales. And you would -- we are assuming that everything is going to be produced through pipelines first from the -- a pipeline from the offshore platforms to the shore, then from the shore across NPR-A to Prudhoe to join in -- the oil would join in with TAPS, the gas with the future pipeline. And that's why it takes 77 years. You are assuming that you don't produce the gas right away, but you do produce it eventually. So about halfway through that process you are starting to produce gas, and that extends it out in time.

Also this scenario includes the years of exploration, seismic exploration, drilling exploration wells, and a fairly quick find of a successful exploration well. Right now in the Chukchi we have had five exploration wells drilled. They have all been plugged again. There has been no economic discovery made to date. So, you know, we estimate any given prospects has less than a ten percent chance of success, that if you drilled an exploration well into it, you would find enough oil and gas to make it economic to develop.

Okay. So that's why it's 77 years. We go from exploration. Development means putting in the additional wells, the platforms, the pipelines, the infrastructure to

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produce. Then the production phase. And it also includes decommissioning, which means removal of the platforms, plugging of the wells with cement, cleaning out the pipelines, probably leaving them, the major ones, buried on the sea floor rather than dig them up. But that's a decision to be made at some later date. But we did include the decommissioning. Platform removal is time consuming, so there are several years tacked onto that, included in that 77 years to make sure that everything -- we also include the time for cleaning up and the effects of cleaning up.

Okay. So it's -- it is fairly complex. There is -- in the EIS there is a spreadsheet, an Excel spreadsheet that goes through the schedule. And you can say, okay, how many wells are drilled in that year, how many platforms go in, so you can kind of see it over time. And this forms the basis for the analysis of the environmental effects.

And I will give it back to Mike.

MR. MIKE ROUTHIER: As Betty noted, now that we have this scenario, this hypothetical set of activities that describe what could happen, one version of what could happen in the event of development and production, we then turn those set of activities over to our analysts, our wildlife biologists, our social

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scientists, oceanographers and ask them the question: What does this mean for the environment? What kind of impacts could result from these hypothetical activities, assuming that they occur?

In conducting their analysis, the analysts considered new information, so things that come up subsequent to 2007 or subsequent to 2011, new studies, new information. Our analysts describe impact producing factors, which are those aspects of oil and gas activities which have potential to cause environmental effects. And they attempt to walk the reader through the impacts of the scenario through time; in other words, tell the story of how these activities assumed in the exploration and development scenario would impact the environment over the course of many decades.

The analysis also assesses the risk of oil spills, both in terms of probability and in terms of potential impacts. Our analysis assumes two large oil spills. That's a little bit more than what the analysis says would be likely, but want to err on the side of capturing potential impacts, so we assume two. By "large," what we mean are spills greater than or equal to 1,000 barrels.

And by looking at historical data concerning activities on the OCS, we assume that those spills -- or

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we assign quantities to those spills to help our analysts understand impacts. Those quantities are a 5,100-barrel spill from a platform and a 1,700-barrel spill from a pipeline. The analysis also updates the hypothetical very large oil spill analysis that was first included in the 2011 document in the wake of the Deep Water Horizon incident. It's a very extremely unlikely event, but the impacts could be very severe, so we wanted to make sure that the Secretary of the Interior, prior to making her decision, understood what could happen in that unlikely event.

The document also looks at cumulative impacts. We understand that oil and gas activities wouldn't be the only thing occurring in the Chukchi Sea that is influencing the environment. Many other things are happening, as well, most notably climate change, but also increased vessel traffic, recreation, tourism, community development, military activities and things of that nature. So we attempt to analyze impacts more holistically.

This slide shows where we are in the process. In late October the agency released this draft second EIS, and that triggered a 45-day public comment period. We are still in that public comment period. That public comment period runs until the 22nd of December. After the comment

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period closes, the agency is going to sit down and review all the comments that we receive, comments submitted on-line, comments from folks like you here tonight, comments from our cooperating agencies, participating agencies, and we are going to look at those comments for the purpose of revising the document and making it better, and eventually we are going to release a Final Second SEIS. We anticipate that happening in late February of next year. As soon as 30 days after we release the final document, the Secretary can issue a Record of Decision; in other words, make her decision about whether to affirm, modify or cancel -- I'm sorry -- or vacate Lease Sale 193.

As far as submitting your comments, as we said you can do so here tonight. We have a court reporter taking down every word. She's going to create a transcript of every public hearing, and we are going to review those and share those with our analysts so they have an opportunity to make the document better based on comments received during the public meetings. You can also submit comments through regulations.gov. That is the federal government's website for receiving public comments. And we actually have a handout outside that walks you through the process about how to use regulations.gov in more detail.

The comment period runs until December 22nd, and

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the regulations.gov portal actually closes at 8:00 p.m. on the 22nd, so please be aware of that. And that is the website listed below.

And that concludes the presentation.

DR. JIM KENDALL: Thank you, Mike and Betty. How about if we turn the lights on and everybody can fill their coffee cup or get their water or something. Then we will be ready to take comments. The comments we are looking for is -- I'll remind you, this is not a decision document. It's informational to go to the Secretary. Our job is to, with our partners and participating agencies and cooperating agencies, pull together all the information and put it in a format that the decisionmaker, the Secretary, can look at it and make a decision. So we don't make the decision. We just pull the information together, and we pass it up.

So that's what we are here for. We are asking for help from people that have looked at the document and can give us information to make the document better. We are looking for information and comments on how to tweak this thing.

With that, let's gets the lights on. We will take a two- or three-minutes break so people can get their water and coffee, and we will go to the comment period and get some information.

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(A break was taken.)

DR. JIM KENDALL: I think everybody is back in the room. I know it's a small group, but we really have to use the microphone so Mary can get what people say. It's really, really important. So without further ado, who would like the microphone first?

MR. JIM PLAQUET: I had a comment on the -- on one of those slides. I think two back it said the impacts. One of the things that I have a real concern about is, you know, we are not going to be the only ones drilling out there. You know, Russia is probably already drilling. There could be other countries. And if we are not out there to respond to one of their mishaps, it's going to be catastrophic up in the Arctic. And that's one of my biggest concerns that if we are not there to respond, because they won't have any oil spill response. They won't have like we have. They don't have to go through this process that we are going through. So that's my biggest concern. If we are not there to respond with our oil spill response equipment to their mishap, we are going to be the ones that suffer.

DR. JIM KENDALL: Thank you. Who else? Don't worry. This isn't a schoolroom. I'm not going to pick on people. I have been known to do that, but not in a public hearing.

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MR. ERNEST ERICK: Even if the Russian people come over there and drill on the land, as a responsible federal government I think it's wrong to do so because I live in those areas for many years now; my grandfather, his wife and all his brothers. We are a relative to those -- relative to the ocean. We are friends to the environment. We are friends to the 1002 lands, the Arctic National Wildlife Refuge I believe in a good way. There are other opportunities inside of the world today.

I don't think that the drilling needs to be in place up there. I think it's the wrong deal. I think other opportunities in this world. I think we have enough oil inside that already been produced. It's there sitting on the land down in the Lower 48. I think that my people should protect those areas, continue speaking on behalf of the 1002 lands, the protection where the caribou has migrate and all the species in the world has migrated in that area. And one spill could be a wrong deal. It will spoil the whole earth. And those streams, those ocean, those rivers, the lakes, it all comes from that area. It's my background.

My future children is going to be using that in a good way. So in the future down the road, we are educated enough today to protect those areas. And we are

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going to still continue doing what we need to do in a good way. This is what we are brought up to do so and as a Native person, the Gwich'in people, speaking in a good way from their heart. And I think that all race, all human being should consider that in a good way. And many years now we have protect that area, the ocean, the 1002 lands, but somehow other Native has spoiled a little bit of the apple, but they need to clean it up themselves because today is a different world.

We done enough to the Mother Earth, and we should continue as all human because our food is being destroyed. Too much military use on the other side that's affecting us today. Field dust comes from oil. If you drop one oil, it comes unhealth issues so that field dust -- it spreads all over the world. We need to clean it up in a good way. And we are the people here today. Throughout the nation we need to consider that.

There is so much beautiful country in the Last Frontier, I believe, my grandfather believed. We have the skill to do it in a good way to protection, final protection, Monument Act protection, Wilderness Act protection in a good way.

So this oil spill that was created in the past, it kill a lot of human. It killed a lot of species, a lot of animals. We have all been affected from it. Let's

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stay for a while for the future generation.

Thank you. My name is Ernest Erick. I'm a Gwich'in Athabaskan.

DR. JIM KENDALL: Thank you. Who else would like to speak? Another shot?

MR. ERNEST ERICK: Department of Interior, they are very good people today. They look at the good side of it. And I do really acknowledge that in a good way. And Congress, federal government, they need to understand that. We need to protect this area from pro-development. We don't need that pro-development in this country. So remember the good things that the God made this land for me and you in a good way for our children.

DR. JIM KENDALL: Thank you.

MS. MAGGIE MASSEY: That's a hard act to follow. I'll try, though. Maggie Massey. So I just want to kind of touch on what you were saying and echo your concerns. And I, too, am -- have a lot of fears about pollution in the ocean and spills in the ocean, whether they are from the Russians or from the United States. And one reason why I'm hesitant in supporting the Lease Sale 193 is that I'm not convinced that we have the capability or the infrastructure to clean up a spill that could be produced by us or anyone else.

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I think that the Deepwater Horizon spill taught us a lot in how little we know and how little we can do, and I think that that, compounded with the issues that arise when you are producing and exploring in shallow Arctic waters where there is ice and darkness, I mean, that introduces so many more factors that I don't think that we know how to adequately deal with yet. And I don't think that those things are necessarily addressed as fully as they could be in these documents. So that's one of my concerns.

I also think that because this document wants to look at cumulative impacts, I think that it's important to actually do that. And I think it's something that's said is done, it's something that we think is a good idea, and doesn't actually happen as often as it should.

So I think if we really look at the cumulative impacts of what this could do to subsistence life ways, what it could do to different wildlife in the area, as well as in NPR-A if there is going to be a pipeline, I think looking at all those impacts together should be enough to say that we don't know enough right now for this to be a good idea for us to move forward.

So for that reason, I would advocate vacating the leases.

DR. JIM KENDALL: Thank you. Anyone else?

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MS. CAROLYN KREMERS: My name is Carolyn Kremers. I live here in Fairbanks. I'm sorry I couldn't be here sooner for your presentation. I teach at UAF, and I had to be there till a little after 7:00. But I wanted to come because I came to an earlier meeting on this proposal. I don't know when that was. Maybe a year or two ago.

DR. JIM KENDALL: About two years ago.

MS. CAROLINE CANNON: I was present for that, and I had more of a chance to look it over than I have tonight. But I did the same thing tonight that I did that night, which is go to the table of contents and look for what it says about oil spills. And as two people have mentioned tonight already, that is a big concern of many Alaskans, I think, is the danger of an oil spill. It's incredible impacts if it happens.

And then thinking about the Arctic Ocean -- in fact, any of our oceans around this state -- Bering Sea, the Chukchi Sea, the Beaufort -- all of these oceans are really powerful. And any of us who have lived on them for any length of time know that, and especially if you have had the opportunity to live in a Native village on a coast, in that -- especially for me I've lived in Western Alaska in the village of Tununak, which is on Nelson Island west of Bethel. So it's not as far north as the

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Chukchi, but I've had the opportunity to visit many coastal villages including Shishmaref, which is quickly eroding and having to move. I've also been to Newtok, which is on Nelson Island near Tununak. Those are the two villages, Shishmaref and Newtok, that are having some of the most big results from sea level rise and erosion and big storms, which many scientists are pretty certain have to do with climate change.

So we are dealing with a lot of factors now. And I think two years later from when this first came out, climate change is an even more important issue for all of us in Alaska for many people who didn't understand its implications until now. And it will just become more important. So we are dealing with really unpredictable weather. And the Gulf Stream in particular has a huge effect on our weather and our climate in Alaska. And we have already seen how -- I think in the last several years we have seen a lot of changes in Fairbanks in our weather, having rain in winter, which we never used to have; having a lot of wind. I have been in Alaska for about 28 years now and in Fairbanks since '88 off and on. Lots of changes that we can see now just in the last couple decades. So we are dealing with lots of things that science and the oil industry cannot explain.

And the oil industry, I feel -- although I

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understand and really appreciate a lot of their goals and I agree that we all need the products of fossil fuels presently, but we are moving more towards alternative fuels. We need to move more towards alternative fuels. And Alaska should be leading the way in that because we have many resources beyond oil and gas. We have wind. We have tides. We have all kinds of things that we could tap into. And it's a transition period. Of course it's going to take decades, maybe longer, for the world to make this transition, but the world must make it. I believe they must make the transition away from fossil fuels to alternative fuels, solar energy. We have many choices and we have many things going on right now in development for that.

So I think we also need to be thinking as Alaskans and as Americans and as world citizens about the future; not just the present, but the future, the seven generations and beyond.

And then looking at the table of contents here, I went immediately to the part about oil spills. And, you know, I was expecting to see more by now. And I spoke to this two years ago, the fact that we don't have a way right now to deal with big oil spills anywhere, to deal effectively anywhere in the world. We have seen that with the Valdez Exxon oil spill. We have seen that with the

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Deepwater Horizon oil spill. But one in the Arctic Ocean? That far north with those kind of conditions with almost no large communities nearby, unlike down in the southern part of the U.S., unlike Southeast Alaska which is closer to more facilities, is closer to Seattle; up at the top of the world, we are talking about a very remote area.

And any of us in the room who have lived or visited up there or lived on the ocean know that it is really powerful. And so if you have an accident, you have got to have -- if you are going to have anything as serious as offshore drilling, then any -- any government considering that or any corporation -- really shouldn't consider it in the first place, I think, for the reasons I've already given, but even if they are because, of course, it's an oil development industry and gas, then really they ought to have the moral fortitude to have the kind of technology it takes to clean that up.

We don't have it. We do not currently have it. And I don't see in this document -- although I haven't got to read it word for word, but when I turn to oil spills -- and I appreciate all the efforts and I really appreciate that in the United States we value data and research and thinking and discussion and diverse opinions and the ability to come to things like this and express different views, have them recorded, have them reported. That's a

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wonderful freedom and right and responsibility that we have.

But looking here on this table of contents, the part -- it goes from the section 4.3, effects of oil and gas exploration, development and production, to talking about effects of the exploration, development and production. It goes from that, which is, looks like, about 200 pages worth, and it goes to 4.4, very large oil spills. Starts on page 406, ends on page 428. So that's 22 pages out of this document, which I didn't even look how long it is, but it's pretty big. 22 pages that are supposedly talking about very large oil spills. But when you sit down and look at it, there is background, there is VLOS scenario, there is opportunities for intervention and response.

So there are three categories there, and at least two of them would be really important -- in fact, background is important, but the other two, a scenario and then opportunities for intervention and response, well, that starts on 416, goes to 428. So that's only 12 pages. That's about six pages each for these issues. And then it goes on to other things.

So, you know, I would think if we have the technology to deal with oil spills, there would be a lot larger section here, and it would be describing in more

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detail what it is, what people plan to do if there is a spill. And we can't guarantee that there won't be because it's not just a matter of, of course, having safe procedures and good equipment and the desire, which I think many big corporations have in the United States to do a good job and to do the right thing. It's not just a matter of that. It's a matter of Mother Nature.

And I've lived and visited places where I have been in big storms and seen what they can do just to people who are on land and have -- know the place, have lived there -- and this person mentioned -- for generations. Even the people like that sometimes lose their lives, lose their boats, lose even their village, as Shishmaref and Newtok are doing, their traditional villages because of the power of Mother Nature. And coupled with climate change, it's not something to take lightly.

So I can't -- I think someone needs -- many of us need to speak out and say that we need to see evidence of the ability to deal with oil spills in that part of our world and our state. And we don't see that now. I doubt that we will ever see it. I actually don't think it's possible. I don't think it's possible to have a way to deal with a big oil spill in any effective way that would stop the kind of destruction it would cause.

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And as you may have read or know, a lot of this study also talks about the risks that there would be. A lot of this is about what would happen if there were a spill biologically, you know, human-wise, in many ways.

So we always are coming back down to, well, then, will there be a spill? I think we can almost guarantee if we have offshore drilling in -- anywhere around the world in the circumpolar north, Russia included, there will be spills and we won't be able to deal with them. And the consequences, as I said, they could be major. I expect they would be major, worse than we have ever seen because of the conditions and where it is. So I just think it's real important.

I'm really glad people are here tonight. And I think we all really need to speak out about the fact that this -- this technology doesn't exist, and I don't think it's going to.

Thank you.

DR. JIM KENDALL: Thank you. Anything else? What I'm thinking about doing is basically ending this as a first session and then hang out for a while and see if anyone shows up later because technically we have got the room from 7:00 until 10:00. And I'm hesitant to end it now, thinking that there might be a group that comes in a little bit later than that. So unless there is anything

else to say, we will break it off now, and if others show up, maybe in an hour, we will give the presentation again. Because I think some of the -- your questions may have been answered in the presentation. So -- anything else? All right. Then why don't we end it now and maybe we will start back up at 9:00 if we have anyone else show up. I'm just hesitant to end it at 8:00 in the evening when we are supposed to start at 7:00 and go to 10:00. Thank you.

(A break was taken.)

(Proceedings adjourned at 8:45 p.m.)

REPORTER'S CERTIFICATE

I, MARY A. VAVRIK, RMR, Notary Public in and for the State of Alaska do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that the proceedings were reported stenographically by me and later transcribed under my direction by computer transcription; that the foregoing is a true record of the proceedings taken at that time; and that I am not a party to nor have I any interest in the outcome of the action herein contained.

IN WITNESS WHEREOF, I have hereunto subscribed my hand and affixed my seal this _____ day of December 2014.

_____
MARY A. VAVRIK,
Registered Merit Reporter
Notary Public for Alaska

My Commission Expires: November 5, 2016

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APPENDIX E – Section 3

Comment Letters

Federal Government

Tribal Governments and Alaska Native Organizations

State Government

Local Government

Other Local Governments

Environmental Organizations

Corporations and Industry Groups

General Public

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS, TRIBAL
AND PUBLIC AFFAIRS

December 16, 2014

Michael Routhier, Project Manager
U.S. Department of the Interior
Bureau of Ocean Energy Management
Alaska OCS Region
3801 Centerpoint Drive Suite 500
Anchorage, Alaska 99503-5823

Re: EPA Comments on the BOEM Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, Draft Second Supplemental EIS, EPA# 05-049-MMS.

Dear Mr. Routhier:

We have reviewed the Draft Second Supplemental Environmental Impact Statement (SSEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, in accordance with our responsibilities under the National Environmental Policy Act (NEPA), as well as Section 309 of the Clean Air Act. Section 309, independent of NEPA, specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions. Under our policies and procedures we also evaluate the document's adequacy in meeting NEPA requirements.

This most recent supplement was prepared in response to the April 24, 2014, remand from the Alaska District Court and addresses the deficiencies identified in the January, 2014 opinion of the U.S. Court of Appeals for the Ninth Circuit. It includes a revised resource development scenario, new information on affected environment and impact analyses, and consideration of alternatives and mitigation, as well as other changes.

We appreciate the revisions made in response to our comments on the Preliminary Draft SSEIS, particularly our comments on the National Pollutant Discharge Elimination System program, water quality and background on the Purpose and Need section. We also recognize the usefulness of the various maps, figures and tables to the reader. We do, however, believe that the reader would benefit from the inclusion of an Executive Summary and recommend that one be included in the Final SSEIS. We also recommend that an Impacts Summary table be included in the Final SSEIS. We believe such tables provide a useful visual aid to clearly compare the impacts associated with each alternative. These suggestions are consistent with EPA's recommendations on prior EIS documents for Lease Sale 193.

As expressed in our comments on the last supplement, we continue to have substantial concerns regarding the potential for spills or releases to impact water quality and subsistence resources. However, we acknowledge that even with the revised production estimates, the probability of such an event remains low. We appreciate the incorporation of new mitigation measures, in part based on new information from the Deepwater Horizon incident, as well as the BOEM's additional planning and oversight responsibilities. We, therefore, assign a rating of "EC-1" (Environmental Concerns-Adequate

Information) to the Draft SSEIS. A copy of the rating system we used to conduct our review is enclosed for your reference.

We appreciate the opportunity to review the Draft SSEIS. Should you have any questions regarding our comments please contact me at (206) 553-1601 or by electronic mail at reichgott.christine@epa.gov, or contact Jennifer Curtis of my staff in Anchorage at (907) 271-6324 or by electronic mail at curtis.jennifer@epa.gov.

Sincerely,

Christine B. Reichgott, Manager
Environmental Review and Sediments Management Unit

Enclosure:

1. U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment, February, 1987.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

Mr. Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

Mr. Routhier:

The National Oceanic and Atmospheric Administration (NOAA) has reviewed the Bureau of Ocean Energy Management (BOEM) Draft Second Supplemental Environmental Impact Statement (SEIS) entitled *Chukchi Sea Oil and Gas Lease Sale 193.*

Please see Attachment 1 for a full list of NOAA's comments. Please direct any questions you may have regarding these comments to:

(for questions on comments 1-6 below)
National Ocean Service Office of Response and Restoration
Ms. Meg Imholt
Policy Analyst
1305 East-West Highway, Rm 10132
Silver Spring, MD 20910
301.713.2989 Ext. 181
meg.imholt@noaa.gov

(for questions on comment 7 below)
National Marine Fisheries Service Office of Protected Resources
Ms. Candace Nachman
Arctic Liaison
1315 East West Highway, Rm 14507
Silver Spring, MD 20910
301.427.8031
candace.nachman@noaa.gov

Sincerely,

for Patricia A. Montanio
NOAA NEPA Coordinator

Attachment 1

National Ocean Service Office of Response and Restoration:

1) **BOEM should consider an alternative in which leases are only permitted for Exploration and Production, ending with enough time such that Lessees would be able to respond to a worst case discharge before the predicted onset of sea ice.**
BOEM highlights some of the concerns with a spill extending into the winter, but does not consider the alternative of only permitting drilling activity at Lease Sale 193 during this time period.

This alternative has already been adopted in practice in the 2012 drilling season to reduce the potential impact of a spill in the region, and should be considered in the leasing process.

In 2012, upon NOAA's request, BSEE required that Shell shorten its drilling season to end on September 23, so that Shell would be able to respond to a worst case discharge scenario occurring on the last day of drilling without the impediment of ice. The actual freeze-up in 2012 occurred on November 2, two days after NOAA's Sea Ice Team's prediction. For 2015, Shell has proposed drilling until October 31, contrary to arrangements made in 2012. Since this practice has already been employed during previous Exploration Plan approval processes, it should be considered as an alternative in the leasing process.

2) **BOEM should include the probability of a large oil spill during exploration in its cumulative assessment.**
By omitting the probability of a large oil spill, this Draft Second Supplemental Environmental Impact Statement underestimates the cumulative effects of leasing in this area. BOEM assumes no large spills would occur during the exploration phase, citing low probability. However, with the significant impacts of a large spill, low probability is not a sufficient rationale to exclude this scenario from the analysis.

A variety of scenarios could result in a large or very large oil spill during the exploration phase. NOAA is aware of other incidents, in addition to Deepwater Horizon, that have resulted in large or very large oil spills in the exploration phase.

Considering the theater of operations for offshore drilling in the Arctic, BOEM should ensure that their cumulative assessment are in concert with and considers the broader transit and vessel operations that would occur under a Vessel Response Plan.

BOEM-2014-0078-0131

3) **BOEM should update its analysis of response tactics to better represent the challenges of Arctic spill response.**
Throughout the discussion of Recovery and Cleanup, BOEM ignores the logistical and environmental challenges that make spill response tactics unfeasible or ineffective during significant parts of the year (Vol. 1 p 424-427). This misrepresents response capabilities in the Arctic, as limited government assets, shortened daylight, low visibility, and extreme weather limits response in the Chukchi Sea compared to other regions. For example, BOEM simply states the limits of mechanical recovery methods "can be utilized." However, a recent BSEE-funded study found mechanical recovery would be "almost impossible in winter" and possible 55-57% of the time in the summer for both the Beaufort and Chukchi Seas (Nuka Research, 2014). This research and other challenges to spill response should be better incorporated into the analysis.

4) **BOEM should update its procedures described for responding to oil in ice to incorporate the challenges and experimental nature of these activities.**
As currently written, BOEM does not adequately describe current procedures for responding to oil in ice, and should better incorporate the challenges and experimental nature of oil in ice operations.

There are experimental approaches to tracking oil and ice but nothing has been proven operationally on a real spill. The process BOEM describes of putting tracking devices in ice and monitoring its location throughout the winter is also experimental, depends on oil and ice moving together, and is not a proven technique for long term applications. Additionally, BOEM describes finding and accessing oil within ice flows, without fully addressing the challenges. Such an operation could be significantly more challenging than in open water. The experimental nature of these procedures should be incorporated to provide better portray these response challenges.

5) **BOEM should revise its recovery rates to better estimate expected rates in the Arctic.**
In estimating the volume of oil reaching shore (Vol. 1, p 423), BOEM relies on studies from warmer climates, using recovery rates that may not appropriate for the Arctic. As a result, BOEM may overestimate the amount of oil that is likely to be recovered and underestimate the amount of oil likely to reach the shore.

Given that many response tactics are less effective in Arctic OCS conditions, NOAA recommends updating these rates with a more representative estimate, such as the Estimated Recovery System Potential (ESRP), to better incorporate the expected recovery in the Chukchi Sea.

6) **BOEM should clarify the parameters used in its datasets for estimating the probability of oil spills in the Exploration Phase.**
BSEE asserts that among its data on exploration wells drilled on the OCS from 1971-2010 no crude large or very large spills have occurred, except Deepwater Horizon. NOAA is aware of other exploration wells resulting in large or very large spills,

BOEM-2014-0078-0131

including IXTOC I, which are not represented in this dataset. BSEE should clarify that this only refers to the United States OCS, and that other exploration wells have resulted in large or very large spills outside of the United States.

National Marine Fisheries Service Office of Protected Resources:

7) **The description of the Beringia Bearded Seal DPS in Section 3.2.4.1 of the EIS should be updated to note that in July 2014, the U.S. District Court for the District of Alaska issued an order vacating and remanding to NMFS the December 2012 final rule to the extent it affects the Berinigia bearded seal DPS. This ruling is currently under appeal.**

BOEM-2014-0078-0171

United States Department of the Interior
NATIONAL PARK SERVICE
Alaska Region
240 West 5th Avenue, Room 114
Anchorage, Alaska 99501

IN REPLY REFER TO:
1.D. (AKRO-EPC)

ERTS RR-14/0132

Michael Routhier, Project Manager
Bureau of Ocean Energy Management
Alaska Outer Continental Shelf Region
3801 Center-Point Drive, Suite 500
Anchorage, Alaska 99503-5823

Subject: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 – NPS Comments

This letter provides comments from the National Park Service (NPS) on the *Draft Second Supplemental Environmental Impact Statement* (OCS EIS/EA BOEM 2014-653) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193, in Alaska, published November 7, 2014.

The NPS has statutory obligations to protect marine resources for subsistence in the southern Chukchi Sea along approximately 1,000 miles of inner and outer coastline including lagoons and estuaries of Bering Land Bridge National Preserve (BELA) and Cape Krusenstern National Monument (CAKR).

CAKR's mandates, among others, are
to protect habitat for seals and other marine mammals; to protect habitat for and populations of, birds, and other wildlife, and fish resources; and to protect the viability of subsistence resources.

BELA's mandates, among others, are
to protect habitat for, and populations of, fish and wildlife including, but not limited to, marine mammals; to protect the viability of subsistence resources; to protect and interpret coastal formations; to protect habitat for internationally significant populations of migratory birds; to provide for archeological and paleontological study, in cooperation with Native Alaskans, of the process of plant and animal migration, including man, between North America and the Asian Continent.

We encourage the Bureau of Ocean Energy Management (BOEM) to consider the potential and cumulative impacts of vessel traffic through the Bering Strait as a part of the Exploration Plan and Development and Production Plan evaluations associated with Lease Sale 193. There are

significant migratory pathways for birds and marine mammals in this area that have the potential to be impacted depending on the transit timing of vessel traffic through the Bering Strait to the lease sale operations area.

The NPS also has statutory responsibility to protect plant resources and wildlife in the 12.1 million acre Western Arctic National Parklands. Recent research has identified southern arctic air pollutant critical loads that have the potential to be exceeded with moderate inputs of new regional emissions. Lichen communities in particular, are both extremely sensitive to air pollution and important to ungulates (especially caribou), regional environment, and subsistence resources. The NPS encourages BOEM to examine the combined air quality inputs from all phases of exploration and development, and to analyze potential effects relative to arctic critical loads for nitrogen, sulfur and heavy metals.

Thank you for the opportunity to comment on this important issue. We are pleased to answer any questions or provide specific information about sensitive resources of concern. If you have any questions, please contact Linda Hasselbach at 509-341-9198 or Linda_Hasselbach@nps.gov.

Sincerely,

Frank Hays
Superintendent, Western Arctic National Parklands

cc:
regulations.gov, BOEM-2014-0078

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701
December 22, 2014

Michael Routhier
Program Analysis Officer and Project Manager
Bureau of Ocean Energy Management, Alaska OCS Region
3801 Centerpoint Drive Ste. 500
Anchorage AK 99503-5820

Re: Draft Second Supplemental EIS for
Chukchi Lease Sale 193

Dear Mr. Routhier:

Thank you for the opportunity to review the Draft Second Supplemental Environmental Impact Statement for Chukchi Lease Sale 193 (SEIS). We appreciate the expansion of the impact area of a large/very large oil spill scenario in the document to include areas in the western Chukchi Sea. As many of our trust resources inhabit the entire Chukchi Sea at some stage of their life cycles, it is important to recognize an oil spill occurring in the eastern Chukchi has the potential to impact areas beyond U.S. waters.

Although we recognize leases have been sold within the project area under conditions outlined in the 2007 EIS for the Chukchi Sea planning area, the Service continues to advocate for a cautious approach to oil and gas development in the Chukchi Sea. In this light we support Alternative III (Corridor I Deferral) as outlined in the Draft Second SEIS as the preferred alternative. We consider this alternative to afford the most protection for our trust resources through maximizing the distance between potential development and sensitive habitats found within ice leads and along the Chukchi Sea shoreline.

The Service offers the following general comments for your consideration, as well as specific comments in the enclosed attachment.

Placement of Lease Sale 193 Infrastructure
Volume 1 Page 31-32. Pipelines: At the coast, a new facility would be constructed to support operations and serve as the first pump station. In the August 2014 draft of the Draft Second SEIS, a likely location for the shore base was indicated to be between Icy Cape and Point Belcher. However, in this recent draft a likely location for the shore base was indicated to be between Icy Cape and Barrow. Landfall of the pipeline and its associated infrastructure in the vicinity of the Barrow would pose a great deal more environmental risk than other coastal locations because of the sensitive and valuable wildlife habitat in the general vicinity of the "Barrow Triangle."

The Bureau of Land Management's (BLM) 2012 National Petroleum Reserve- Alaska Integrated Activity Plan / Environmental Impact Statement (NPR-A IAP/EIS) guides planning infrastructure within NPR-A. It provides for oil and gas infrastructure development in areas that would create the least conflict with sensitive environmental resources. The general location of potential oil and gas pipeline landfalls Alternative B-2, BLM's Preferred Alternative, are described in Volume 1 (pages 22-23): "While this plan makes no decisions regarding a corridor for infrastructure associated with potential offshore development in the Chukchi or Beaufort seas, such a corridor could be accommodated in this alternative. This plan makes no decisions regarding the potential placement of a pipeline or any accompanying infrastructure within this corridor. It allows for an application to be filed, and it anticipates that such an application would be subject to full NEPA review and decision. This infrastructure would not be allowed on lands where new nonsubsistence permanent infrastructure is prohibited, but all other lands would be available for application for pipelines and other infrastructure in support of potential offshore oil and gas development (see Figure 2-1). No provisions of this alternative other than the prohibition of new nonsubsistence infrastructure would directly or indirectly prohibit infrastructure in support of offshore development in the Chukchi or Beaufort seas."

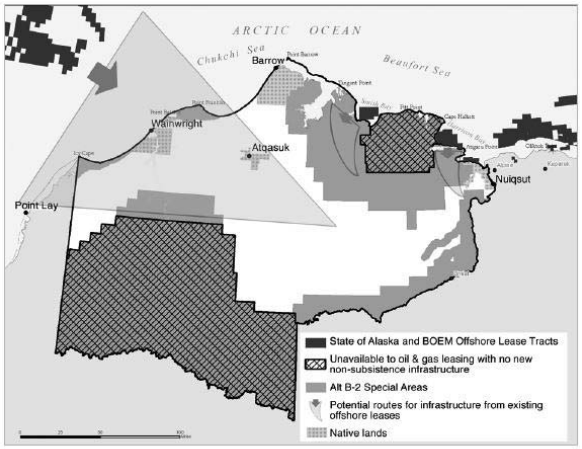


Figure 2-1. Illustration of some potential routes for infrastructure in support of development of existing offshore leases consistent with the preferred alternative

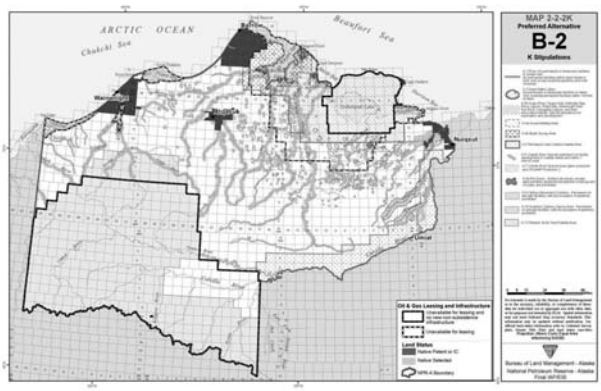
In BLM's 2012 IAP/EIS, pipeline infrastructure routes consistent with the Record of Decision would be located between Point Lay and the north end of Peard Bay. Further, BLM has special restrictions (see BLM's NPR-A set of K Stipulations) on facility development in coastal waters and within one mile of the coast along portions of its jurisdictional coastline (Map 2-2-2K). The Service supports BLM's proposed pipeline corridor and recommends BOEM adopt a similar stipulation and associated BMP's regarding onshore development to reduce potential impacts of land-based facilities on our trust resources.

Cumulative Effects
Volume 1 Page 583–650: For many species, impacts associated with oil spills during the development phases are not considered in the cumulative effects analyses of the Draft Second SEIS. In addition, effects that may result from large and very large oil spills as described in the scenarios are missing from many of the conclusion sections associated with the various phases of the project. The cumulative impact of these spills on marine invertebrates, fish, birds and mammals over a 50 to 80 year exploration and development scenario in the Chukchi Sea could be significant. Therefore, we recommend it should be acknowledged and analyzed in the Cumulative Effects section of the Draft Second SEIS.

Marine and Coastal Birds
Environmental Resource Areas (ERAs): The discussion in the document regarding the potential impacts of a large oil spill to environmental resource areas (ERAs) used by marine and coastal birds contains valuable information. However, potential impacts to some important habitats, such as seabird nesting colonies and adjacent foraging areas, are **not** included in the ERAs. The Service believes a more comprehensive description of locations where marine birds congregate within the impact area is needed to fully capture impacts in the spill scenario model.

Affected Environment: The Service recognizes the need to identify a specific geographic area when considering potential impacts of oil and gas development on fish and wildlife resources. However, for certain species of birds it may be pertinent to expand the scope of the impact area. For example, for brant, failed breeders from locations as far south as the Yukon-Kuskokwim Delta migrate to Teshekpuk Lake to molt. If these birds pass through the project area, they may be impacted by activities associated with the oil and gas development in the lease area. This is also applicable to passerine species which may be impacted through collisions with onshore and offshore infrastructure. We suggest including general information regarding the diversity of birds and flyways within the project area. Passerines flying through the project area include Palearctic and Nearctic birds and may include species of conservation concern.

Impact Producing Factors
Impact Producing Factors (IPFs): The conclusion sections for different time periods should reflect the potential impacts from all IPFs. For example, for the Exploration and Development (Year 10-25) period, the conclusion does not adequately capture the potential impacts from a large oil spill (which is expected to have population-level effects). It may benefit the reader (and the document) if impacts without an oil spill (which are a given) were first described in the conclusion, followed by the description of impacts with an oil spill (which is a possibility).



4

Many sections of the Draft Second SEIS rely heavily on information in previous documents associated with Lease Sale 193 (2007 Final EIS, 2011 Biological Evaluation, and 2012 USFWS Biological Opinion). In general, more of this information should be brought forward into the Draft Second SEIS, thereby making the information more available to the reader. In addition, new research and papers have been published since 2012 regarding development, impacts and resources of the Chukchi Sea. We have included the citations for these references in the Attachment with this letter for your consideration.

Thank you for the opportunity to comment. If you have any questions regarding these comments please contact Jewel Bennett at 907/456-0324 or jewel_bennett@fws.gov.

Sincerely,

Sarah C. Conn
Fairbanks Fish & Wildlife Field Office Supervisor

Attachments:
USFWS Specific Comments Draft Second SEIS Chukchi Sea LS193.pdf
USFWS Additional References Draft Second SEIS Chukchi Sea LS193.pdf

cc: Lon Kelly, Field Manager, Arctic Field Office, BLM

5

USFWS Comments for Draft Second SEIS for the Chukchi Sea Oil and Gas Lease Sale 193

Page	Section Number	Commenter Initials	Comment
41	3	MLB	Description of the Environment. In general, what defines the spatial area that is considered in the Affected Environment discussions? A figure placed at the beginning of this section may help to orient the reader, although the bounds for the spatial area considered in the Affected Environment discussions may change with the resource of consideration (i.e. a discussion for birds may be different than one for vegetation). An Area of Effects figure would be useful, perhaps at the start of each Affected Environment resource section (e.g. Air Quality, Water Quality, Marine and Coastal Birds…).
71	3.2.2	LNS	Change sentence: "Anadromous fishes are a subset (*of what? diadromous fishes?*)where…"
71	3.2.2	LNS	Is there a reference/website for the EFH designations?
71	3.2.2	LNS	Is there a depth range for "bottom water" ? For example – xx meters above the seafloor
72	3.2.2	LNS	Last sentence; 3rd para: is this sentence still referring to demersal fishes? Move to next para
73	3.2.2	LNS	First para; 2nd sentence: "Sockeye salmon…" does not make sense…reword.
73	3.2.2	LNS	First para; last sentence: further north in Chukchi and/or in Beaufort?
76	3.2.2	LNS	Last para; first sentence: A little confusing maybe should reference number of species in parans (8 species) so as not to lead the reader into thinking 20 new species were added…
77	3.2.3	MLB	Marine and Coastal Birds. The area considered (as the area of potential impact?) seems to be the offshore waters of the Chukchi Sea, from Point Hope to Barrow and across the Chukchi to the Russian coast. Explicitly defining the area and providing some context for how it was defined (e.g. based on prevailing ocean currents) would help to orient the reader as to why certain areas are included or not included in the various discussions. For example, why are areas of the Beaufort Sea all the way to the MacKenzie Delta included in the discussion, but nothing further south than Point Hope along the Chukchi Coast is discussed? [Correction… it appears that Kotzebue Sound is also considered part of the leased area vicinity, as stated on p 235 (2nd paragraph). However, page 235 is the first time that anything south of Point Hope is mentioned for marine and coastal birds.] Although we recognize it is necessary to place bounds on the potential area of impact, for certain species of birds, it may be pertinent to expand the scope of the spatial area considered. For example, in brant, failed breeders from locations as far south as the Y-K Delta migrate to Teshekpuk Lake to molt. If they pass through the project area, these birds may be impacted by activities associated with the Lease Area.

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77	3.2.3	MLB	Marine and Coastal Birds. Given that this section does not give an exhaustive list of bird species found in the Lease Area (or potentially affected area), the reader should be referred to a species list somewhere in the document (perhaps in an Appendix?). The logic behind the species chosen for detailed discussion in this document should be provided as an introduction to this section.
77	3.2.3	KJK/DBI	Marine and Coastal Birds. 2nd to last line: "…most marine birds will have moved out of the Chukchi Sea by late fall (November) before the formation of sea ice." [noting how late that can be, since we see marine birds in the area through October, depending on conditions]. Note somewhere – the southern Chukchi sea (along with northern Bering Sea) known to have seasonally high densities of birds at sea (Drew and Piatt 2010, Humphries and Huettmann 2014, Kuletz et al. 2008, Wong et al. 2014, Gall et al. 2012) and large seabird colonies (Piatt and Springer 2003, USFWS 2014).
77	3.2.3	MLB	Marine and Coastal Birds. "Departure times… vary between species and often by sex **or age** within the same species…" (Add bolded words.)
78	3.2.3	CPD	Threatened and Endangered Marine and Coastal Birds, Spectacled Eider. Paragraphs 2 and 3: …33,587 birds (Stehn et al. 2006)… as many as a few thousand pairs may nest… COMMENT: I agree with the latter estimate, and I believe the long-term average is about 3,000 pairs.
78	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Spectacled Eider.1st and 3rd paragraph: It is confusing to switch back and forth between "North Slope" and "ACP" in the Spectacled Eider text. Are these terms, for purposes of this document, describing the same area? If they are, just use one or the other. If they are not, where are the areas they describe defined?
78	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Spectacled Eider. Spectacled Eider, 6th paragraph: Move the information in the last sentence ("overall, many spectacled eiders remain in LBCHU until…" into the fifth paragraph. Then all of the information that establishes the timing of seasonal use of Ledyard Bay is easily found.
78	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Spectacled Eider. Is nmi (nautical mile) defined somewhere in this document?
78	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal birds, Spectacled Eider. Last paragraph on this page: The final sentence in this paragraph needs to be edited for clarification. What is meant by, "sub-adult spectacled eiders were found to remain in the Arctic during the summer"? All spectacled eiders remain in the Arctic in the summer… Was this meant to be on the Alaska Coastal Plain?
78	3.2.3.1	KJK/DBI	Threatened and Endangered Marine and Coastal birds, Spectacled Eider. Last line, p.78 – don't you mean the eiders that remained in the Arctic after breeding moved as far EAST as Mackenzie

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			River Delta, Canada (or were these birds breeding in Canadian arctic?
79	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Spectacled Eider. First paragraph on this page: This paragraph on population trends for SPEI should be rewritten to be more easily understood by a general audience. Consider leading with a statement that for purposes of this analysis, BOEM considers the population trend to be roughly stable, then give supporting data from Stehn, Larned, and Platte (2013). Maybe instead of, "total bird aerial index", you could state more simply that the observed trend is based on aerial surveys. Do include the growth rate and CI.
79	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Spectacled Eider. We suggest that it may be more appropriate to state that spectacled eiders are considered stable as a species (with the Russian birds included) but slightly declining when considering only the North Slope breeding population. This should then carry forward to the effects analyses later in the document (e.g. in 4.3.6.1).
79	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Steller's Eider. 2nd paragraph: This paragraph starts off rather awkwardly with, "Although Steller's eiders may occur at greater densities outside of Kasegaluk Lagoon, the total numbers are probably low given the small numbers that breed on the North Slope." Why is Kasegaluk Lagoon singled out here? Is this where Steller's are expected to be found within the Lease Area/potentially affected area? If so, rewrite this sentence to make that clear. Or was this sentence trying to speak to whether the numbers at Kasegaluk Lagoon are considered particularly high or low? If so, it seems like additional information is needed to give this sentence context.
79	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Steller's Eider. 2nd paragraph: If (as stated) Kasegaluk Lagoon is not where breeding Steller's Eiders would be expected to nest within the Lease area/potentially affected area, where would they be expected to be found?
79	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Steller's Eider. 2nd paragraph: Rewrite the last sentence to focus more on presence in the Chukchi Sea (the immediately-affected environment) than presence in Chukotka (where potential for impact is a more distant possibility). How long do birds that remain in the Lease Area and adjacent areas (e.g. Ledyard Bay, Icy Cape, Wainwright, Peard Bay) stick around?
79	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Steller's Eider. In general, it seems this section needs some additional information so that it more closely parallels what has been written for SPEI. For example, what is the population trend for Steller's Eider? If information that has been included for SPEI is not available for STEI, then it may be useful to state that for the

			reader. Also, importantly, if population trend information is not presented for Steller's eider, then you cannot later make the claim that the population of Steller's eiders is considered stable, as occurs in the effects analysis (e.g. p 235). (We do not believe there is enough information to draw conclusions about Steller's eider population trends.)
79	3.2.3.1	MLB	Threatened and Endangered Marine and Coastal Birds, Steller's Eider. Please replace, "Alaskan-breeding Steller's Eider," with, "Alaska-breeding Steller's Eider."
78-79	3.2.3.1	KJK/DBI	Threatened and Endangered Marine and Coastal Birds. Add a write up on the short-tailed albatross, which has been observed at sea in the lease area. Suggestions (in addition to brief intro on status, distribution): The endangered short-tailed albatross was observed near the Lease Area in the Chukchi Sea in August 2012 (Day et al. 2013), and although this was a first record of any albatross species in the Chukchi Sea, the short-tailed albatross has been using the northern Bering Sea more in recent decades (Kuletz et al. 2014). As the more northerly of the three North Pacific albatrosses, and with a growing population that might be reoccupying its historic range, it has potential to be affected by oil and gas exploration and development
79-85	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds. The species accounts are brief, but generally well written, except for several outdated references. All references to Sowls, Hatch, and Lensink (1978) should be changed to US Fish and Wildlife Service (2014). Be consistent with capitalization of species names.
79-85	3.2.3.2	MLB	Other Marine and Coastal Birds. In general, consider giving conservation status or population trends for non-TSE species. For example, is 400,000 birds a significant proportion of the Black-legged Kittiwake population or not?
79-85	3.2.3.2	MLB	Other Marine and Coastal Birds. It may be beneficial to include additional resources for this section, in order to ensure that the species highlighted in the text are more comprehensive. Please review the USFWS Birds of Conservation Concern 2008 lists for BCRs 2 and 3 to make sure that this section covers any birds on that list that could be affected by this project. The Audubon Alaska 2010 Watchlist is another good resource that could be reviewed. For any species identified to be important for inclusion, additional information may be available through the Alaska Native Heritage Program Biotics mapping tool and species status reports.
79-85	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds. For these lesser-known species (Black guillemot to Glaucous

			gull), there is probably more recent information available, particularly via the NPPSD, Industry reports, cruise reports, Birds of N. America accounts. I don't have time to dig them all up.
79-85	3.2.3.2	MLB	Other Marine and Coastal Birds. Latin names are used inconsistently throughout this section. Not using Latin names in the text makes the document more readable for the common reader, so it is ok not to use them (unless a species does not have a common name, or the common name applies to more than one species). However, we encourage you to consider a table in an appendix that lists both common and scientific names of species that may be found in the Lease Area/area of impact.
79	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Cliff-nesting Seabirds, Common murres and thick-billed murres. Cite USFWS 2014 after the first sentence. Re: line 2 – is there a reference for statement that if the colony is reduced in size it may be abandoned for decades? Is this a generality about murres from some other region, or specific to Chukchi colonies? Seems an odd statement here. Murres are typically considered piscivorous, but thick-billed murre diet can sometimes be dominated by euphausiids, which are abundant in areas (esp. greater Hanna Shoal and around Barrow Canyon) of the eastern Chukchi in late summer/fall, and likely why TBMU hang out there during that time (see Gall et al. 2012, Kuletz et al, in press).
80	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Cliff-nesting Seabirds, Horned puffin and tufted puffin. Write up is OK. Change Sowls et al 1978 to USFWS 2014.
80	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Cliff-nesting Seabirds, Black-legged kittiwake. Add highlighted text: Black-legged kittiwakes are surface foragers that are primarily piscivorous, but also consume large zooplankton, including euphausiids. Breeding colonies of the black-legged kittiwake in the Chukchi Sea (Cape Thompson and Cape Lisburne) are at the northern limit of their breeding range in Alaska. Data collected between 1960 and 1978 reported approximately 48,000 black-legged kittiwakes bred along the Chukchi Sea coast between Cape Thompson and vicinity to Cape Lisburne (USFWS, 2005). Divoky (1987) reported black-legged kittiwakes were abundant from mid-July until late September in the Chukchi Sea north of Cape Thompson, and recent studies in the Lease Areas (Gall et al. 2012) in 2008-2010 found that kittiwakes were usually most abundant in August and early September, but did occur in the area in late September-early October. Kittiwakes range far offshore through most of the area considered for the lease sale (Gall et al. 2012, Kuletz et al. 2008). Divoky (1987) estimated over 400,000 black-legged kittiwakes in the pelagic Chukchi Sea, but there is no recent estimate for total numbers in

			the region. A substantial portion of this population occurs in the Leased Area in the open-water season.
80	3.2.3.2	MLB	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents. Is this the correct header for this section? Why are we referring to "Bering Sea" breeders?
80	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents. Last sentence: The timing and location of these bird and prey concentrations cannot be predicted with any certainty, although some features, such as Barrow Canyon and southern Hanna Shoal area, consistently appear to have seasonally abundant prey that attracts top predators (Ashjian et al. 2010, Grebmeier et al. 2006, Okkonen et al. 2011, Pickart et al. 2013), including seabirds (Kuletz et al., in press).
80	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents. Be consistent with capitalization of species names. Add Day et al. 2011 to terrestrial distribution information. Suggested edits: Kittlitz's murrelet is a small diving alcid that consumes fish and large zooplankton. Their foraging areas may occur in or near the Leased Area. Kittlitz's murrelets have been observed on a regular basis in the Chukchi Sea as far north and east as Point Barrow and is widespread throughout the Chukchi Sea in late summer and fall (Bailey, 1948, Divoky 1987, Day et al. 2011). Although rare in the Beaufort Sea, it has been recorded there (USFWS, 2006, Day et al. 2011). Highest densities in the Chukchi Sea have been recorded in the fall within 50 km of shore (Day et al. 2011), although high densities (considered 'hotspots) have also been recorded in fall in the Hanna Shoal area (Kuletz et al. in press).
79-85	3.2.3.2	MLB	Other Marine and Coastal Birds. Where relevant, consider using the Alaska Seabird Information Series (2006) and the Audubon Arctic Marine Synthesis (2013) maps (for example, of seabird colonies) as resources for location and species that may be present within or adjacent to the Lease Area.
80-81	3.2.3.2	MLB	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Northern Fulmars. The information on Northern Fulmar abundance needs to be rewritten for clarity. First it is stated that abundance differs significantly in all years, then an estimate of abundance is given. It may be better to give a range of abundance estimates, with a confidence interval. This same section states that a consistent pattern of abundance could not be ascertained among study areas (Gall and Day 2012), then it states that the seasonal pattern of abundance was

			consistent among study areas. These statements seem to be in conflict.
80-81	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Northern Fulmars. More recent citation from the Gall & Day studies – Gall et al. 2012. Suggested edits: Gall and Day (2012, Figure 13) (Gall et al. 2012) could not ascertain a consistent pattern in northern fulmar abundance among study areas in the Chukchi Sea, 2008-2012. The abundance of northern fulmars differed significantly among seasons in all years. The seasonal pattern of abundance was consistent among study areas, although fulmar densities were much higher in summer of 2009, when warm Bering Sea water flooded the study area (Gall et al. 2012). Northern fulmars were present in low abundance (<0.5 birds/km²) in the Lease Areas, and were most numerous from late August to mid-September [check fig 6 of Gall et al 2012 – doesn't show this']. Flocks totaling in the low hundreds were observed during the late summer and early fall around the Klondike and Burger prospects during seabird surveys (Gall and Day, 2012). An analysis of four decades of pelagic surveys in the Bering Sea found that northern fulmars have shifted the center of their distribution north in recent decades, and at-sea densities show evidence of decline in the Bering Sea (Renner et al. 2013). Although this analysis did not include the Chukchi Sea, it could indicate occasionally greater use of those northern waters as well.
81	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Short-tailed shearwater. OK. Should include Gall et al. 2012 (in place of or in addition to Gall and Day 2012). [could include now or add later once published]: Areas of especially high densities of short-tailed shearwater occurred in summer and fall (2007-2012) over Barrow Canyon and Hope Basin, and off of Wainwright (summer) and Point Hope (fall); all of these areas of high density were within the 50 m contour (Kuletz et al. in press).
81	3.2.3.2	MLB	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Auklets. Include confidence intervals with density estimates.
81	3.2.3.2	MLB	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Auklets. What are the "seasons" being discussed here in terms of abundance patterns? August-October would seem to be one season?
81	3.2.3.2	MLB	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Auklets. What is meant by the sentence, "seasonal patterns of abundance among study areas also differed among

			years"? Could this be restated more simply to, "Patterns of abundance differed by study area and by year"?
81	3.2.3.2	MLB	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Auklets. Would these species perhaps be more appropriate categorized as Cliff-Nesting Seabirds?
81	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Auklets. Change Sowls et al to USFWS 2014. Add Gall et al. 2012 where Gall and Day 2012 are used. The Hanna Shoal area may be an important molting area for crested auklets (Kuletz et al., Marine Bird and Mammal Surveys, p. 54, in Grebmeier 2012a) During surveys from 2007-2012 (combined), very high densities of crested auklets were found in the Hanna Shoal area in summer and fall (Kuletz et al. in press). Least auklets were in the Hanna shoal area in summer, and in Hope Basin in summer and fall (Kuletz et al. in press).
81	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, Bering Sea Breeders and Summer Residents, Black Guillemot. Change the citation of the last sentence to Ainley and Divoky 2001.
81	3.2.3.2	MLB	Other Marine and Coastal Birds, High Arctic-Associated Seabirds, Ross' gull. Ross' gull is correctly written, "Ross's gull." In this case, because it is a name, it is not an issue of style convention.
81	3.2.3.2	MLB	Other Marine and Coastal Birds, High Arctic-Associated Seabirds, Ross' gull. Ross's gull may be encountered anywhere along the coast and offshore waters of the Beaufort and Chukchi Seas, including in the winter months (i.e. it is not just found at Point Barrow).
82	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, High Arctic-Associated Seabirds, Ivory gull. General biology/distribution: Mallory et al. (2008). Concerns about apparent decline in this species in the arctic: Gilchrist et al. (2005).
82	3.2.3.2	MLB	Other Marine and Coastal Birds, High Arctic-Associated Seabirds, Arctic tern. This species may be "rare" in pelagic waters of the Chukchi according to Divoky (1983), but there are known colonies along the coast of the Chukchi. These should be identified in the text. See the most recent Alaska Seabird Information Series (2006).
82	3.2.3.2	MLB	Other Marine and Coastal Birds, High Arctic-Associated Seabirds, Arctic tern. Arctic terns breed on tundra adjacent to the Chukchi Sea. Therefore placing Arctic terns in the High Arctic-

			associated Seabirds category may incorrectly characterize their presence in/use of the Lease Area.
82	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, High Arctic-Associated Seabirds, Arctic tern. For general information: Hatch et al. (2002).
82	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, High Arctic-Associated Seabirds, Jaegers. For general information, use Birds of North America species accounts.
82	3.2.3.2	KJK/DBI	Other Marine and Coastal Birds, High Arctic-Associated Seabirds, Glaucous gull. Change Sowls et al to USFWS 2014. For general information, use Birds of North America species account.
82	3.2.3.2	MLB	Other Marine and Coastal Birds, Tundra-breeding Migrants, Yellow-billed loons. It's a bit awkward to categorize this species as a Tundra-breeding Migrant, then place other loons under waterfowl.
83	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, Loons. Yellow-billed loons are mentioned here and discussed in more detail in a preceding section. Place all YBLO discussion in one place.
83	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, Loons. Arctic Loons are also present in the Chukchi but absent from this discussion.
83	3.2.3.2	CPD	Other Marine and Coastal Birds, Waterfowl, Common eider. Paragraph 1. COMMENT: On line 2 and 5, I thought of replacing "Most" with "Many Arctic Coastal Plain- Alaska." Then I realized your "most" may be for the Chukchi coast only, and not all of the ACP.
83	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, Common eider. Present the population trend information given in the last paragraph with confidence intervals.
83	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, Common eider. Rephrase this information so that it is more reader-friendly for a general public. For example, don't discuss indices. Maybe rephrase to something akin to, "Common eider data from surveys along the ACP indicate an increasing population overall (1986-2012) and in recent years (2003-2012) (Stehn, Larned, and Platte, 2013)."
83	3.2.3.2	CPD	Other Marine and Coastal Birds, Waterfowl, Common eider. Para 2. ADDITION: Dau and Bollinger (2012) estimated flat annual growth rates for indicated breeding pairs (0.1%/year, r=0.014 and -3.2%/year, r=0.325) for totals of common eiders breeding along the Arctic Coastal Plain - Alaska. THEN KEEP: Stehn et al. (2013) re-evaluated common eider .....2003-2012 periods. ALSO ADD CITATION TO PAGE 15.
84	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, King eider. Present the population trend

			information with confidence intervals.
84	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, King eider. Rephrase this information so that it is more reader-friendly for a general public. Maybe rephrase to something akin to: King eider data from surveys along the ACP indicate an increasing population overall (1986-2012) and in recent years (2003-2012) (Stehn, Larned, and Platte, 2013).
84	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, King eider. Move information about satellite-tagged birds into the discussion about areas used by king eiders (i.e. place it in the paragraph two paragraphs before this).
84	3.2.3.2	CPD	Other Marine and Coastal Birds, Waterfowl, Brant. Paragraph 1, line 4. ADDITION: … and Peard Bay (Dau and Larned, 2005; Ritchie et al. 2012). Also add citation to page 51.
84	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, Greater white-fronted goose. The first sentence states that this goose breeds along the coast. The next sentence states that in northern portions of Alaska, this goose breeds within 30 km of the coast. Please clarify. Should the first sentence perhaps include along the coast and on nearshore islands?
84	3.2.3.2	MLB	Other Marine and Coastal Birds, Waterfowl, Greater white-fronted goose. Seems unnecessary to say how GWFG reach Alaska… Only include information that is relevant to the Lease Area action.
84	3.2.3.2	CPD	Other Marine and Coastal Birds, Waterfowl, Lesser snow goose. Paragraph 1, line 4. ADDITION: … snow geese (2011 FEIS, Section III.B.5.f(7); Ritchie et al. 2013).
84	3.2.3.2	MLB	Other Marine and Coastal Birds, Shorebirds. Seems funny to reference an old version of the Alaska Shorebird Conservation Plan, then acknowledge that there is an updated version. Consider just updating the text to reflect the current plan. If the purpose of the last introductory sentence is to explain that the source relied upon in the previous EIS is still good, then update the reference here anyway and simply state that. Please reference the 2008 version throughout the text.
84	3.2.3.2	MLB	Other Marine and Coastal Birds, Shorebirds. Modify the last sentence in the first paragraph to state that shorebirds move west and south along the Chukchi Sea coast. (Birds are using more than one flyway into and out of this region, including flyways to and from Asia and South America.)
85	3.2.3.2	MLB	Other Marine and Coastal Birds, Shorebirds, Phalaropes. Please provide a citation for the statement that phalaropes' distribution is tied to zooplankton abundance.
85	3.2.3.2	MLB	Other Marine and Coastal Birds, Shorebirds, Dunlin. Consider changing this subheader to be "Sandpipers", so that you can also discuss Pectoral and Semipalmated Sandpipers.

85	3.2.3.2	MLB	Other Marine and Coastal Birds, Shorebirds, Dunlin. The information provided here for Dunlin is sparse. Consider expanding. For example, Dunlin are likely local breeders in coastal habitats adjacent to the Lease Area, not just migrants staging and stopping over in Kasegaluk Lagoon.
85	3.2.3.2	MLB	Other Marine and Coastal Birds, Raptors and Ravens. Consider changing this subheader to, "Birds of Prey," since owls are not technically raptors. Neither are falcons, so the change would be more inclusive.
85	3.2.3.2	MLB	Other Marine and Coastal Birds, Raptors and Ravens. Ravens are included in the subheader for this paragraph, but then they are not discussed. It is worth noting that ravens are common where they can find nesting and roosting platforms, whether that is a utility pole or structure associated with a whaling or fish camp. I would either include information for them here, or bump them into the Passerines section.
85	3.2.3.2	MLB	Other Marine and Coastal Birds, Raptors and Ravens. Because owls are not considered a marine species, it may be worthwhile to rewrite the owl paragraph to state that they are known to use coastal and marine habitat year-round (i.e. during open water and periods of pack ice). Also, A. Gall may have a more recent report of a snowy owl on board a vessel in 2014 that could be included in the final version of this SEIS.
85	3.2.3.2	CPD	Other Marine and Coastal Birds, Raptors and Ravens. Paragraph 2, line 1. Check Latin names (e.g. Bubo scandiaca**)**.
85	3.2.3.2	MLB	Other Marine and Coastal Birds, Passerines. Consider making this more comprehensive by including some information about the diversity of birds/flyways that could be affected by project infrastructure. Birds flying through this area (that could, for example, be impacted by light pollution from offshore structures) include both Palearctic and Nearctic birds. Passerines flying through the area may be birds from the East Asia/Australasia, East Asia/East Africa, and Pacific Americas Flyways. Consider whether any of the species that may migrate through the area would be considered species of conservation concern.
85	3.2.3.2	MLB	Other Marine and Coastal Birds, Passerines. Latin names should be italicized. This was not done here for Northern Wheatear and Swainson's Thrush.
85	3.2.3.2	CPD	Other Marine and Coastal Birds, Passerines. Paragraph 2, lines 3 and 4. Check Latin names… yellow warbler, ***Dendroica*** *[Setophaga] petechia*. Also check font for Latin names…. Arctic warbler, northern wheatear…
88-89	3.2.4.1	JB	The polar bear description section should contain reference to a new paper that reports on the decline in the Beaufort Sea polar bear population during the last decade. The paper is currently

			in press: Bromaghin, J.F., T.L. McDonald, I. Stirling, A. E. Derocher, E.S. Richardson, E. V. Regehr, D. C. Douglas, G. M. Durner, T. Atwood, S. C. Amstrup. Polar bear population dynamics in the southern Beaufort Sea during a period of sea ice decline. Ecological Applications. http://dx.doi.org/10.1890/14-1129.1
88-89	3.2.4.1	JB	The status of the Pacific walrus as a candidate species is not described.
151-153	4.1.2.5 Table 4-2	LNS	Information in Appendix A does not include **how** number of small spills was arrived at in Table 4-2. Within the main text there should be a paragraph explaining how the 800 number was arrived at. Also, might be useful to note the number of recorded spills vs amount of exploration. *Also see comments for Appendix A (below).*
154	4.1.2.5	LNS	Last para. 15,000 exploration wells on the OCS over 40 years. When OCS is generically referred to – what is the area (US waters, Alaska waters, North America?) This may be defined somewhere else in the document – if it is great. Otherwise it needs to be defined.
228	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors. The second and third paragraphs under the header for this subsection seem out of place. Why are predation, hunter impacts, and hydrocarbon spills pulled out and discussed here, but other IPFs are discussed, "in the phase in which they first appear?" Having these three IPFs discussed here, without mention of others, leaves this section feeling imbalanced. Consider moving the information contained in the second and third paragraphs into the relevant phase. There may be a better way to organize this section on IPFs in general. Consider introducing each of the IPFs (e.g. Noise, Physical Presence, Discharges) right up front in this section, along with a discussion of how they directly or indirectly impact marine and coastal birds. Then for each phase, the reader can be referred back to these IPF descriptions. This may help to more thoroughly treat each topic, while reducing the potential for redundancy.
228	4.3.6.1	MLB	Marine and Coastal Birds, Alternatives I and IV, Impact Producing Factors. It would be helpful to identify what aspects of development lead to increased raven and fox presence/predation (e.g. artificial sources of food, perch sites, den and nest sites, as discussed in Liebezeit et al. 2009). Although impacts from avian predators may be difficult to document, list some of the expected impacts associated with increased presence of predators. Consider including information from more comprehensive or more recent publications (Saalfeld et al. 2013, Liebezeit & Zack 2009b). (I've provided a reference list in a separate document.)

228	4.3.6.1	MLB	Marine and Coastal Birds, Alternatives I and IV, Impact Producing Factors. The currently-cited Liebezeit et al. 2009 focuses on the impacts of avian and fox predators to shorebirds and passerines, while other bird groups that are discussed in Section 3 may experience different impacts or different impact levels. Consider a more thorough literature review to inform this discussion and potential mitigation options. For example, we would like to see a discussion about the potential for increased predation at seabird colonies (including by invasive rats).
228	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors. Para 3, line 1. COMMENT: Accidental hydrocarbon spills……not considered routine……have the potential to occur [**history of exploration shows this**].
228-231	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration. The conclusion section is the strongest part of the 4.3.6.1 Exploration discussion. Make sure that the pieces leading up to here support the conclusion. Include language like, "localized, short-term, direct and indirect effects," where it is appropriate, which helps to orient the reader to the scale of expected impacts. Don't mention species in the conclusion for the first time (i.e. talk about shearwaters, auklets, king eider, and common eider in the appropriate sections prior to the conclusion).
229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration. The introductory paragraph for Exploration should recognize that there will also be some land-based activities that will produce impacts to marine and coastal birds, including some limited land-based infrastructure. The impacts that are produced are not noise, physical presence, discharges, and accidental oil spills but are rather caused as a result of these IPFs.
229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Noise. This section relies heavily on three previous documents (2007 FEIS, 2011 Biological Evaluation, and 2012 USFWS Biological Opinion). In general, more information should be summarized in this document.
229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Noise. The last sentence under the general noise paragraph (just before "Noise from Vessels") should be modified to reflect that it is not just birds that feed in the water column that may be impacted by noise. Consider more fully listing groups of birds that are known to be more sensitive to noise (e.g. loons, colonial seabirds).
229	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Noise. Para 6, Noise from Aircraft, lines 4-5 COMMENT: Most marine ……*are well aware of helicopters and planes and react/move away* **[some species like staging brant and molting sea**

			ducks will be impacted (see Ward and Stehn. 1989, Ward et al. 1994 and 1999)] …can harm them.
229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Noise. Planes and helicopters are not the only source of airborne noise (e.g. construction would be a major source of noise for a finite period of time). Consider providing a bullet list or table summarizing potential noise sources.
229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Noise. This section seems to be lacking in terms of full consideration of the impacts that noise could cause to birds. Besides causing birds to move away from the noise source, or direct physical injury, what other impacts could noise have? For example, there is potential to impact birds' foraging and/or reproductive success, potential for acute or chronic stress... More information should be provided here before moving on to a description of impacts by noise source. It seems that the Physical Presence subsection does a better job with this than the Noise subsection. To avoid redundancy, some of this detail can be moved up to the main Impact Producing Factors section (p 228), then referenced here.
229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Noise from Exploration Drilling. "If the sound bothered them," is not a very scientific way of describing how noise from exploration drilling might impact birds. Please describe this in terms of displacement, stress, injury, lowered foraging or reproductive success, etc. Additionally, just because a bird is not physically injured by noise does not mean that an impact is not experienced. Being, "bothered," and moving away from a noise sources indicates a form of harassment, which is considered an impact.
229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence. Describe how structures could impact flying birds.
229	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence. Para 7, Physical Presences, lines 3-4. COMMENT: Same comment as "noise from Aircraft" above (CPD).
229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Vessels. Again, rather than relying on previous documents that have described the potential impact of the physical presence of vessels, summarize more of that information here. The information about the pair of Steller's Eiders that were encountered and moved away from the contractor vessel in Ledyard Bay seems unnecessarily detailed, especially given that a more complete summary of potential impacts is lacking.

229	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Vessels. Consider listing groups of birds that may be more sensitive to vessel presence, or specific locations within the lease sale area in which vessel traffic may have a disproportionate impact (e.g. flightless, molting birds that are already energetically-taxed may experience greater impacts from vessel disturbance/displacement than some other groups of birds).
230	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Vessels. Consider listing groups of birds that may be particularly vulnerable to light attraction.
230	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Vessels. Consider making Visual Impacts its own IPF, with light attraction listed in that section (instead of in Physical Presence).
230	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Vessels. As is done for other IPFs, please include a statement about minimizing/mitigating light pollution associated with exploration vessels and structures, to avoid bird attraction.
230	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Vessels. Last paragraph, consider rearranging the text so that if flows better: "BOEM calculated bird encounter rates… These rates may underestimate impacts… BOEM estimated birds would encounter drillships at a rate of… The rates are an index… Not all encounters are fatal… BOEM will overestimate the level of impact…" It feels that some information is missing in this paragraph. What is the estimated level of impact? If not provided here, since it is mentioned, you may want to refer the reader to the section where this is discussed.
230	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Aircraft. Consider listing groups of birds that may be particularly vulnerable to disturbance by aircraft (e.g. colonial seabirds).
230	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Aircraft. Para. 4, Aircraft. COMMENT: No mention of disturbance/displacement of staging and molting sea ducks.
230	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Physical Presence, Field Crews. Describe the potential impacts associated with land-based field

			crew activity here, rather than relying on information provided in an (unrelated) EA.
230	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Discharges, Discharges of Muds and Cuttings. The last two sentences of this paragraph have little to do with birds. Simplify this information to state something to the effect of: discharges of materials to the marine environment are regulated, and both direct and indirect impacts to marine and coastal birds are expected to be minimal (or whatever level of impact is expected).
230-231	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Discharges, Discharge of Grey Water and Ballast Water. This section doesn't describe the potential impacts to birds from the discharge of grey water and ballast water. I would suggest combining this with Discharges of Muds and Cuttings and calling it simply, "Discharges." I think the permit information that is currently listed in these two sections is provided elsewhere in the document? It belongs, for example, under water quality but not under a discussion of impacts to marine and coastal birds.
231	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Accidental Oil Spills. Fix the indentation for all of page 231/263.
231	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Accidental Oil Spills. "Etc." has no place in this sort of document. List a full summary of potential impacts, rather than referring the reader back to an earlier document. There have been new research and papers since 2011 on the effects of oil spills on birds, and this section should reflect the new information.
231	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Accidental Oil Spills, Conclusion. As this reads right now, what appears to be the conclusion for the entire Exploration section falls underneath the Accidental Oil Spills Header. Fix the font for the Conclusions so that it is not a subheader.
231	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Accidental Oil Spills, Conclusion. Replace, "i.e.," in the second sentence with, "e.g."
231	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Exploration, Accidental Oil Spills, Conclusion. Para 4, line 5, Conclusion. COMMENT: Few birds …..to disturbances. [Temporarily yes, but population level impacts may be significant [e.g. brant, spectacled eiders, etc.] (Johnson 1993).
231	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Physical Presence. It seems inappropriate to state that the number of vessels/barges operating in the marine environment will increase above the levels operating during the exploration phase,

			but then to state that the bird encounter rate with this increased number of vessels is assumed not to increase beyond that which was assumed for exploration. What is the logic behind this assumption?
232	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Habitat Alteration. Habitat loss directly related to a project footprint is not the only way that habitat alteration may impact marine and coastal birds. Degradation of adjacent habitats (for example, due to dust deposition on vegetation, or increased predator presence as a result of perching opportunities or creation of a travel corridor) may also have an impact on birds.
232	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills. Include a Small Oil Spills subheader, to make it clear that small oil spills are expected to occur. Then you can refer the reader back to the text in the Exploration section (as currently written). (In general, all impact producing factors that may occur within a given phase should be explicitly listed for that phase, even if the reader is then directed back to a previous section in which the impacts from that IPF are described.)
232	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills. The general impacts of a large spill to marine and coastal birds (in general) should be listed at the beginning of the Large Oil Spill discussion, as they are for the small oil spill section under Exploration.
232	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills, Large Oil Spills. Para 1, lines 6-11. "The magnitude of potential…Pacific brant….conspicuous population-level effects." COMMENT: True and especially for the small "Western High-Arctic" sub-population (see Pacific Flyway Council Brant Plan [2002].
233	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills, Large Oil Spills. Para 2. This paragraph is true and well stated, but the information contained herein is lost in the discussion later on. It should be emphasized that impacts to a large proportion of the Spectacled or Steller's Eider populations would have long-term, population-level impacts. There is mention in this document that it could take eiders 2-3 generations to recover from such an impact. Both species have low productivity, and a 2-3 generation recovery time could be detrimental to the species.
232-233	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills. The discussion of large oil spill impacts to birds is too vague in some

			respects and does not appear to be a full and careful treatment of the topic. Rather than beginning this discussion with locations where specific birds may be impacted, consider introducing the groups of birds that are most at risk, then give examples of important habitats/locations where they are found. This was presented nicely in the Revised Draft SEIS, Chapter IV, Environmental Consequences (May 2011). In general, start broad and go narrow… identify habitats of importance, than give specific locations. Identify taxa that may be particularly vulnerable, then give specifics for species.
232-233	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills. Consider including separate discussions of the effects of a spill during the open-water season versus a winter spill here.
232	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills. Where the impacts of large oil spills are discussed, seabirds should be included in the following sentence: "Kasegaluk Lagoon, Peard Bay, colonies… [provide important habitat to] a variety of waterfowl and shorebirds."
232	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills. We suggest deleting the following sentence: "The situation with brant is similar to a wide variety of waterfowl and shorebirds that use similar areas of the Chukchi Sea." Instead, list other taxa that would be expected to be vulnerable to population-level effects in the event of a large oil spill. At the very least, simply state that other waterfowl, shorebirds, and seabirds that use affected areas of the Chukchi Sea could experience lethal and sublethal effects that could ultimately result in a population-level effect. Use brant as a, "for example…"
233	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Development, Accidental Oil Spills. First sentence on page 233. Please replace, "Arctic Slope," with either, "North Slope," or, "Arctic Coastal Plain,' or, "Alaskan Arctic," as appropriate.
233	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Production, Physical Presence. The current text compares Physical Presence during the production phase to physical presence during the exploration phase. Please consider rewriting this to compare the production phase with the development phase. If there are no changes to potential impacts to birds, then you could state that (as was done for Noise).
233	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impact Producing Factors, Production, Habitat Alteration. Degradation of habitats adjacent to the project footprint may also have an ongoing impact on birds, as stated in comments for the Development phase.
233	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time. List the

			page number associated with the continuum or scale that describes impacts, for ease of reference.
234	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5). It would help make the case that impacts during Exploration would be expected to be minor if this section included some indication of the temporal scale (e.g. impacts associated with survey vessels, such as noise, physical presence, and discharge, would be localized and *short-term*).
234	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5). Please define "encounter" in terms of bird:vessel encounters (i.e. does an encounter mean a bird strike, with assumed mortality? Or does an encounter also account for disturbance to migratory birds in the area?).
234	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5). Over what period of time did the Shell operation take place, in which impacts from birds encountering vessels were higher than anticipated (i.e. what is the length of your dataset, and does the new bird:vessel encounter rate allow for annual variability)? Please provide a citation for this information. Additionally, I would consider striking the first sentence from this paragraph ("Impacts from birds encountering vessels…") because it is not necessarily relevant to this document. The important information is that reports from Shell's operation during **X** period of time were used to calculate the rate at which birds could be anticipated to encounter vessels in the Chukchi Sea. State that more simply.
234-235	4.3.6.1	KJK/DBI	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5). Apparently Large Oil Spills cannot occur during this phase, since they are not addressed, which surprises me, especially after the Deep Water Horizon Spill, it would seem like a large event could happen during exploration, but I am not an expert on this matter.
234-235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5). I would modify language that states that T&E eider encounters cannot be estimated because you had to use some sort of estimate to arrive at the conclusion that T&E bird encounters with vessels would be low... If the USFWS BO (USFWS 2012) was used to estimate the potential T&E eider take through vessel encounters, then state that explicitly. Include a total anticipated loss for both of the T&E species for the period of interest.
235	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time,

			Exploration (Years 1-5), Conclusion. COMMENT: Vessel and structure strikes are important but far less so than small or large oil spills. Hence, I disagree with the last sentence that suggests *impacts would be minor*.
235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5), Conclusion. I am comfortable with your conclusion that during Exploration (Years 1-5), bird:vessel strikes would pose the greatest potential for direct effects. (In future phases, as the potential for crude oil spills increases, oil spills may pose a greater threat.)
235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5), Conclusion. Use caution making the statement that spectacled eiders have a stable population—it really depends on which proportion of the species is being considered. Additionally, there is not enough information to say whether Steller's eiders are stable or declining. Therefore, if there is supporting documentation for this concluding statement, I suggest that it would be important to cite that in the conclusion or the preceding discussion. Furthermore, what information was used to arrive at the conclusion that any degree of loss of T&E eiders during Exploration (years 1-5) would be recovered during the subsequent breeding cycle? Because the North Slope-breeding population of spectacled eiders is considered slightly declining, any degree of loss likely would not be replaced during the subsequent breeding cycle, whether or not the population was able to sustain that loss over the short term. Furthermore, the subsequent breeding cycle would see more losses, and the one after that…Such that we might suppose there could be a slight decline throughout the period of loss, and it might take more than one breeding season to recover from the cumulative loss. The same may be expected for Steller's eiders, which are known not to breed every year. Any evidence that losses would be recovered in the subsequent breeding season should be cited.
235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5), Conclusion. "It is possible for the more abundant seabird…" Replace, "fewer than 50 strikes," with, "up to 50 strikes." Also consider starting this sentence with, "It is anticipated that the more abundant seabird…"
235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5), Conclusion. "Should any population decline *for any reason during the Exploration phase*, the potential impacts of bird encounters with vessels could increase to be

			more than a minor impact." Add the italics to clarify that the declines may not be related to activities as a result of the Lease Sale. Additionally, I suggest moving this sentence to be the third-to-last in the conclusion, followed by, "The activities conducted during this time period…"
235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 1-5), Conclusion. Second to last sentence: please add, "localized," which is an important part of the "minor impacts" definition.
235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 6-9). 55 bird:vessel encounters per season resulting from the presence of five vessels seems very low compared to the 53 encounters resulting from 1 drilling vessel in one season, as estimated in the previous Exploration period. Please provide more information regarding how this figure was derived (e.g. are the five vessels in the water during less of the open water period than the drilling vessel was?). If cumulative bird:vessel encounters are presented in Exploration (Years 1-5), then cumulative bird: vessel encounter numbers should also be presented here, and they should also be broken down by group as they were previously. Are the vessels previously associated with exploration drilling during years 1-5 still in the water, such that the 55 encounters associated with these five vessels are in addition to another 414 bird:vessel encounters (from 1 drilling and 4 support vessels)?
235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 6-9). Construction of the onshore pipeline would not have direct effects to most marine and coastal bird species during the construction phase (this does not just apply to T&E species).
235	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 6-9). What is the scale of the impact expected to spectacled eiders, as a result of onshore pipeline construction? (i.e. Is it a minor or moderate impact?) Also consider listing how arrive at this conclusion (e.g. impacts are long-lasting …).
236	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 6-9). Regarding the onshore pipeline, the document states that impacts to Steller's eiders were not estimated because they nest in a relatively small area around Barrow,

			which would not be along the pipeline corridor. However, on page 32, it is stated that a likely location for the shorebase would be between Icy Cape and Barrow, which indicates the pipeline could impact Steller's eider nesting habitat. This needs to be reconciled. We strongly suggest that this pipeline corridor be refined to exclude Steller's eider habitat, following the plans laid out in the NPR-A IAP/EIS.
236	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 6-9), Conclusion. The conclusion should acknowledge that there will be effects from both the onshore *and offshore* pipeline.
236	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 6-9), Conclusion. The conclusion states that no species would experience more than 50 mortalities as a result of IPFs during the Exploration (Years 6-9) period and determines that this is a moderate effect. For Exploration (Years 1-5), 50 mortalities or less was considered a minor effect. Please reconcile/clarify this. If impacts could increase above "moderate" for declining species, what level would they increase to? Additionally, please state that up to 50 mortalities per species is considered a moderate (or minor, depending on which is correct) effect for non-T&E species. (This helps to transition to the paragraph following.)
236-242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25). Check the font for the headers and subheaders in this section to make sure the flow is correct and the sections match other phases. It appears that this section is broken up into these main components: Accidental Oil Spills, ESA-listed Birds, Marine and Coastal Birds. However, there are certainly discussions of other IPFs, and birds are discussed throughout, so I'm not sure what the intent here is. Also, the overall Conclusion on p 242 should be pulled out (via font). As it is right now, this appears to be a conclusion only for the effects of large oil spills.
236	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25). "New direct effects include the physical presence of platforms in the marine environment and birds striking these vessels (53 per season per platform) could be killed." Please replace, "vessels," with, "platforms," in this sentence for

			clarity. Then add a clause for the following sentence so that it states, "The level of bird loss estimated for Years 6-9 (502 birds per season) will continue, such that maximum estimated mortality per season during this period would be 1,091 birds (by Year 22)."
236	4.3.6.1	MLB	If impacts from vessel and platform encounters could increase for declining species, what level would they increase to? Major is the highest level listed on the scale on page 158 (Section 4.2), so additional description is necessary.
236	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25). In the third paragraph, I assume the statement, "Overall, the activities conducted during this time period are anticipated to have a major impact on marine and coastal birds," applies just to bird encounters with vessels and platforms, as detailed in the preceding paragraphs. Please clarify. Is it fair to estimate spectacled eider mortalities, "in the tens," for years 10-25, when the estimate for years 1-5 appears to be approximately 13 mortalities? This doesn't seem to scale up properly… Likewise for Steller's.
236-237	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25). Please expand on what vessel and platform encounters mean for T&E species. Do we expect a population-level effect? Yes, a smaller number of T&E eiders would be impacted than non T&E seaducks, but what does this mean for these species (which have smaller population sizes, as stated)?
237	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills. First sentence, please add italicized words: "While spills can occur on land or in the marine environment, spills to the marine environment… because of their ability to spread and persist in coastal *and marine* environments."
237	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills. In the introduction to this oil spill effects review, the reader should be referred back to a list of possible impacts to birds resulting from oil spills, available on p 231.
237	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Small Spills. Yellow-billed

			loons are no longer a candidate species, so they do not need to be called out individually (as T&E eiders are), even if the information is technically correct. Unless BOEM has determined that for some reason this species would be particularly vulnerable to a small spill within the Lease Area and vicinity (more so than other non T&E species)…
237	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Small Spills. Incomplete thought in the first paragraph: "If the >500 bbl crude oil spilled and escaped containment in close proximity to concentrations of molting or foraging flocks of marine and coastal birds." Please complete the thought.
237	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Small Spills. Second paragraph, clarify statement: "The bird activity… and for many shorebirds, can vary greatly *by year (?)*…" Also add times of year and locations that are identified as important for shorebirds (e.g. post-breeding shorebirds concentrate at mudflats at river deltas and in lagoons).
237	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Conditional Probabilities. Is ERA defined somewhere? Consider defining it in this section, since it hasn't been used in recent bird-related text. Likewise for OSRA model. An in-document section or page reference might be useful here. (Most of the text in the second paragraph under this subsection can probably be deleted, for ease of reading. The important points here are largely within the third paragraph of this section.)
237-242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Conditional Probabilities. Please list a page number for Table A.1-10 and one for Maps A.1-2a-f, as well as page numbers for all following tables and maps. These can be presented in their relevant sections or right up front, but the reader should definitely be able to easily locate these figures for reference while reading through this section.
237-242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills. I would suggest that some information be brought to the front of this section in order to give thorough treatment to summer and winter spills (e.g. bird hotspots and percent chance of contact) for both ESA and non-ESA species, while avoiding redundancy. Consider moving the scenarios (summer and winter) up, such that ERAs only need to be discussed once for each season. Then you can

			move a discussion of areas used by ESA and non-ESA species under the scenarios, and possibly even move the anticipated mortality section into the seasonal scenarios as well.
237-242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills. I would like to see some more overarching, more general but meaningful discussion of the sorts of habitats that could be vulnerable to a spill. This section gets bogged down in ERAs and specific locations, and as a result I think it misses the mark for some habitats. There are bird hotspots aside from the spring leads, Ledyard Bay, Peard Bay, and Kasegaluk Lagoon that could be recognized (e.g. seabird colonies and foraging areas, mudflats where shorebirds stage). In order to more comprehensively capture potential impacts, I would like to see this information presented before getting into a detailed discussion of specific locales. Section 4.5.5 may do a better job with this…
237	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, ESA-listed Birds, Summer Spill. Again, acronyms need to be defined here because this may be the first time we are seeing them in the bird section (e.g. LAs, PLs). Try to reduce jargon in these sections as much as possible while still retaining the critical information addressing how the impacts analysis was arrived at…
238	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, ESA-listed Birds, Summer Spill. What is the significance of 180 days in the summer analysis (i.e. why was this time range chosen for analysis?). What is the expected persistence of oil in important summer habitats (i.e. how long could effects to birds last)? Please explain this here and in subsequent summer spill sections. Does the spring lead system really belong in a summer spill analysis? I think it may make more sense to discuss this under the winter spill scenario, in terms of how it would impact birds.
238	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, ESA-listed Birds, Winter Spill. Please modify the sentence that begins, "A 180-day period is used in this analysis…" to reflect that this period allows winter spills to overlap with the spring lead system, as well as the summer open-water period. Make this same edit for all subsequent winter spill scenario discussions.

238	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, ESA-listed Birds, Winter Spill. It is not clear whether a winter spill that could enter the LBCHU would pose a threat to post-breeding SPEI entering this habitat unit. In general, this discussion (and that for summer spills) does a pretty good job of detailing how risk was assessed. However, a bit more time could be spent connecting the dots. This is handled a bit better for non-T&E species.
238	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, ESA-listed Birds, Anticipated Mortality. The timeline in this section is a bit out of order, given that the discussion goes from spring to nesting to post-breeding to spring… See if there is a better way to organize this. Which breeding population is being discussed in this section? Please be specific. Add a citation for satellite-tagged males located in Simpson Lagoon and Harrison Bay (and if possible, where they were tagged). The non-ESA Anticipated Mortality section seems to have a better discussion of assumptions that go into estimating impact. Can any of that be brought into this section?
239	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, ESA-listed Birds, Anticipated Mortality. While I agree that a large oil spill could result in a major impact to Steller's eiders, the last sentence describing why does not make sense. Please discuss this in terms of the definition of a major impact, as given in the scale described on p 158. You might also add that a spill in the spring lead system would be expected to have a population-level effect on STEI.
239	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Marine and Coastal Birds, Summer Spill. ESA-listed birds were discussed in a previous section. No need to duplicate that information here. Do the contact percentages for ERAs important to non-ESA birds (e.g. seabirds) change? Please update this section as appropriate.
239	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Marine and

			Coastal Birds, Summer Spill. Consider reorganizing the information contained in this section so that all information presented for seabirds (e.g. murres) is kept together, all information for waterfowl is kept together, etc. (I think you just need to swap the order of a couple of paragraphs.)
239	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Large Spills, Marine and Coastal Birds, Summer Spill. Para's 2-6. COMMENT: Important with respect to brant, common and spectacled eiders. I can't respond on the percentages.
239	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Marine and Coastal Birds, Summer Spill. 5th paragraph. Many post-breeding waterfowl stage offshore in Ledyard Bay (ERA10) as they begin migration to the Bering Sea. However, I don't think this applies to most other groups of post-breeding birds. Please correct the first sentence in this paragraph to include only those groups that stage offshore in Ledyard Bay.
240	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Marine and Coastal Birds, Winter Spill. Discussion seems to leave out some important habitat areas (e.g. Ledyard Bay CHU, areas used by high concentrations of seabirds).
240-241	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Large Spills, Marine and Coastal Birds, Anticipated Mortality. COMMENT: Understates the potential effects of small and large oil spill.
240-241	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Large Spills, Marine and Coastal Birds, Anticipated Mortality. Be sure you capture all groups of birds that could experience mortality as a result of a large spill (i.e. seabirds, shorebirds, waterfowl…). Then you can call out specific species that may be vulnerable in specific locations (e.g. brant, murres….).
240-241	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Marine and Coastal Birds, Anticipated Mortality. Can you reorganize this section so that it reads according to season? E.g. try placing paragraph 2 on p 240 after paragraphs 3 and 4 and fix the transitional sentence.

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240	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Marine and Coastal Birds, Anticipated Mortality. It is not just seaducks that would be vulnerable to alighting on oiled waters. Perhaps change the second sentence in the last paragraph to be more general.
241	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Accidental Oil Spills, Large Spills, Marine and Coastal Birds, Anticipated Mortality. Again, the discussion in the paragraph continuing from page 240 needs to be more general. A spill near Peard Bay could affect a substantial proportion of birds nesting on the eastern coastal plain as they moved toward the *Chukchi Sea*, the Bering Sea, *and points farther east and south*.
241	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Spill Response Activities. Please define OSRP.
241	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Spill Response Activities. Please explain up front why hazing would take place, such that the reader understands it is purposeful harassment of birds to keep them out of their preferred (but oiled) habitats. Hazing has both a disturbance and displacement effect, as well as (hopefully) the benefit of preventing oiling of the majority of birds that would typically use the oiled area. Then you can move into existing paragraph 2, and it should be clearer what is being discussed.
241	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration and Development (Years 10-25), Spill Response Activities. In addition to loss of nests due to increased predator access, human activity could result in direct take of nests (for example, nests could be crushed by foot traffic or abandoned as a result of activity). I would argue that impacts to nesting birds could be moderate (and not just minor). Enough activity in coastal nesting habitat could result in the loss of an entire breeding season for all of the birds that would typically nest there. Although alternative habitat may be available, the short Arctic breeding season may preclude displaced breeding birds from a undertaking a successful first or second nesting attempt.
241	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Spill-Response Activities. COMMENT: Passes much of the burden of response to USFWS.
241	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time,

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			Exploration, Development, and Production (Years 10-25), Spill-Response Activities. Para. 5-6. COMMENT: These texts suggest the potential response to a large spill… will be ineffective. In the conclusion on page 242, it further states that the potential for contact does exist. The conclusion also suggests spectacled and Steller's eider populations in the area are "stable and robust" and that any loss "would be recovered during subsequent breeding cycles." Numerous biologists would disagree.
241-242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Spill-Response Activities. Paragraphs 4-6. I would consider moving these paragraphs up in this section, such that oil spill response activities are discussed before the potential impacts from such response activities are discussed. I would also consider presenting the following information earlier in this section of the document: "…for purposes of analyzing the impact of a large oil spill on marine and coastal birds, oil spill response in the Chukchi is assumed to be ineffective…" At least move it into the first paragraph for this section (make it the last sentence).
242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Prey Reduction or Contamination. This section fails to capture the potential effects on concentrations of seabirds using the area. Seabirds breeding at colony sites typically forage adjacent to the colony site (and they may not have an alternative). If an oil spill affects the marine habitat near a colony containing a large proportion of a species' population, effects could be moderate to major. Also, reduced food resources are captured well, but effects associated with ingestion of contaminated food resources are not.
242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Conclusion. The conclusion section should capture that this time period is the first time that the possibility of a large oil spill is introduced. The statement that the chance of contact from a large spill to ERAs important to marine and coastal birds is "relatively low" is subjective. Actually, it appears that there is up to a 59% chance that a large oil spill, if it occurred, would contact areas important to birds. That does not sound very low to me. Please include some data to support that the chance of a spill contacting important bird habitat is low, or rephrase this statement.
242	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time,

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			Exploration, Development, and Production (Years 10-25), Conclusion. Para. 3, lines 6-8. COMMENT: I do agree with this statement that major impacts [to threatened species] will likely occur, but I disagree that they will be "less than severe." This is subjective opinion, not based on fact. Other than switching from "major" to "moderate" impacts, this opinion is repeated in the last sentence of the Conclusions on page 243 and 244 (e.g. para 2, lines 1-2, …. "mortality rate is not anticipated to impact any one species to a population-level effect."). However, see page 232 re: large oil spills and brant.
242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Conclusion. I question whether the statement that the estimated bird:vessel encounter rate is not anticipated to impact any one species to a population-level effect adequately captures the anticipated impact. The discussion on p 236 indicates that, for several species, the impact could be major, and that should be stated here.
242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Conclusion. Yellow-billed loons do not need to be singled out in the conclusion, unless they are considered to be more vulnerable to some aspect of this LS than other non-T&E bird species.
242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration, Development, and Production (Years 10-25), Conclusion. Are impacts to marine and coastal birds expected to be major or moderate overall? Please check your definitions for these impact levels. I think the impact is major, based on the discussion leading up to this conclusion. I would also spend some time discussing the expected impacts without an oil spill (which are a given) versus the expected impacts with an oil spill (which is a possibility). The conclusion does not do a good job capturing this difference, and it is important in that a large oil spill is expected to have population-level impacts (the impacts of a large oil spill would not be less than severe.)
242	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Development and Production (Years 26-50). Please clarify that, "Noise and disturbance impacts to marine and coastal birds *as a result of new construction activities and/or seismic surveys* would be minimal…" if these are indeed the activities that this paragraph pertain to.
242-243	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Exploration (Years 6-9). Please discuss how many bird:vessel encounters are expected per season, as for previous time periods (consider giving a range, including the maximum). Give a

			breakdown of how many of the encounters will be new, as well as what the cumulative total is (I am assuming that no vessels or platforms have been removed from the water, such that the impact listed per season in prior periods continues; but if a reduction has taken place, that could be recognized here in a sentence). Please provide more information regarding how this figure was derived (i.e. how many total vessels will be in the water?). Is moderate impact then an accurate depiction of impacts for all species? Vessels and platforms in the water are continuing to accumulate…
242-243	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Development and Production (Years 26-50). As mentioned in comments for previous sections, impacts from all IPFs present in each time period should at least be listed, even if the reader is directed back to an earlier time period for more detailed discussion. In this section, for example, the lack of recognition that a large oil spill could occur is a pretty big omission.
242-243	4.3.6.1	KJK/DBI	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Development and Production (Years 26-50). There is no mention of large oil spills in this section or in the conclusions of this section as there were mentioned in previous sections.
243	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Development and Production (Years 26-50), Conclusion. This section describes the addition of two offshore platforms, and the conclusion suggests that these platforms are in addition to those constructed during the exploration and development phases. The previous phase (Years 10-25) states that 1,091 bird:vessel encounters per year (in Year 22) can be expected. If more platforms are introduced into the environment, then estimating a maximum of 459 bird:vessel encounters (Year 29) seems low. See prior comments regarding stable T&E eider populations and recovering anticipated mortality in one breeding season.
243	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Production and Decommissioning (Years 51-77). The same comments as for the previous phases apply here regarding bird:vessel encounters.
243	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Production and Decommissioning (Years 51-77). The statement that, "most Arctic-nesting species…have stable populations," is false, even if you remove the T&E eiders from this sentence.

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245	4.3.6.1	KJK/DBI	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Production and Decommissioning (Years 51-77), Conclusion. There is no mention of large oil spills in section or in the conclusions of this section as there were mentioned in previous sections.
245	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Conclusion. The statement that the greatest amount of harm could come from birds striking vessels, drilling rigs, and platforms is accurate IF you don't consider the potential impact of a large oil spill. Please correct this concluding analysis. It seems that this section as a whole generally ignores the possibility of major impacts resulting from passerine strikes, and that needs to be addressed (they are the group with the highest number of strikes annually). Additionally, whether they may be seabird groups that could be at risk (species or particular colonies) also needs to be considered a bit more carefully. What are, "long-lasting impacts to the resource's function in the environment," when marine and coastal birds are being discussed? Is this suggesting that there could be population-level impacts?
245	4.3.6.1	MLB	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Conclusion, ESA-listed Species. Other than spectacled eiders, there is only one other listed species. Please correct text.
245	4.3.6.1	CPD	Marine and Coastal birds, Alternatives I and IV, Impacts of the Scenario through Time, Conclusion, ESA-listed Species. COMMENT: I agree that… mortality… habitat loss… disturbance… will result in a major impact on T&E birds.
253	4.3.7.1	JB	Discharge of Muds and Cuttings. This section states that after deposition and disturbance from mud and cutting discharges it could take 4-8 years for a sea floor to return to biological usefulness by marine mammals. However, it can take an additional 7 years for bivalves to reach the size useable by walrus, therefore the restoration time may be much longer than stated.
255	4.3.7.1	JB	Large Oil Spills. Note that all oil releases, regardless of size, are unauthorized, illegal events.
271	4.3.7.1	JB	Oil Spill Response. Stress more strongly that during a response oiled carcasses would be collected and removed from the environment. Removal of all types of oiled carcasses (birds, seals, fish, other mammals) is an important primary spill response activity to remove a source of secondary poisoning to scavengers and predators.
445	4.5.3	JB	Phase 2 (Off shore Oil). What supports the statement bulleted at the bottom of page 445 that

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			marine phytoplankton populations would have a rapid recovery of one year or less in the Chukchi Sea?
448	4.5.3	JB	Phase 4 (Spill Response and Cleanup). All similar sections should acknowledge that dispersant chemicals also have their own direct toxicity to invertebrates in the water column as well as the oil toxicity that is also put into the water column by the dispersant.
449	4.5.3	JB	Conclusion. Question the conclusion that a VLOS would cause a <1 year effect on phytoplankton populations in the Chukchi due to normal annual influx of phytoplankton from the Bering and Alaska Coastal currents. Whereas phytoplankton may arrive via those routes on the normal annual cycle, would they have normal survival rates? Would Chukchi phytoplankton concentrations and distributions return to normal in less than one year?
449	4.5.3	JB	Conclusion. Second paragraph contains a good statement about the short, simple food webs and trophic levels of the Arctic ocean waters.
450-451	4.5.4	LNS	FISH – VLOS Phase 1. How far from the source of the explosion would noise impacts occur? Is there any data for how far the noise would travel from the source (rig) and how far out lethal/damaging effects would occur for demersal, mid-water, and surface fish?
452	4.5.4	LNS	1st para (End of bulleted list); what are these references referring to? All of the bulleted items or just the last bullet? It would be helpful to have the references included with the specific topic in the list…
454	4.5.4	LNS	4th para; except that with a VLOS the likelihood of certain species of fish being able to escape the "effects of the spill" because they are strong swimmers is low, especially if the extent of the spill is such that available clean habitat is essentially marginal habitat for the species (colder, warmer, further away from shore, deeper etc.)
454	4.5.4	LNS	Bottom of page; Table C-1 of the 2011 SEIS should be incorporated into this document with updated references and studies if applicable. This is pertinent information to the scenario for a VLOS for this document and should be included in this discussion.
455	4.5.4	LNS	Phase 3; A VLOS potentially could impact lagoons and coastal riverine habitats for a very long time, especially if they are protected from storms (weathering) and/or the oil settles into the sediments and continually re-oils the water. This may continually cause toxicity problems long after the oil has dispersed from the off shore environment. The **long term impacts** of a VLOS to onshore habitats such as lagoons and river deltas and the consequences to fish are not explained well in the offshore scenario or in the bulleted list. For example, could contamination of a lagoon or delta associated with an anadromous stream or river system cause long term impacts resulting in abandonment of that system – and a subsequent decrease in the overall

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			population of a species?
456	4.5.4	LNS	4th para; Not too sure there is a "low probability" of risk for the introduction of invasive species via vessels involved in the cleanup efforts. When one considers where these vessels may originate from and the likelihood of a warming Chukchi Sea over the next 80 years the likelihood increases dramatically. Not just from these vessels but from the production side as well. Invasives are mentioned under *Impact Producing Factors* (page 214) as possibly being introduced during oil and gas activities. At the very least remove the text on page 456 regarding invasives and replace it with a summary (or reference to) the previous text (page 214). Otherwise the document is contradictory regarding the introduction of invasive species.
456	4.5.4	LNS	Beach Cleaning. Is there information regarding the long-term impacts associated with beach cleaning re the Exxon Valdez spill in PWS? The tactic was very controversial and likely has some impact-related literature associated with it. If so, the information and references should be included here.
457	4.5.4	LNS	Phase 5 Long Term Recovery; How does climate change (warming ocean temperatures and less ice) interact with the long term recovery of fish impacted by a VLOS. The implication of fish moving into the area as a result of a changing environment (see Cheung et al. 2014) complicates the recovery scenario. The potential impacts of these interactions should at least be mentioned here.
457	4.5.4	LNS	Table C-1 from the 2011 SEIS should be reproduced here (or somewhere in **this** document and referenced).
461-470	4.5.5	KJK/ DBI	Effects of a VLOS, Marine and Coastal Birds. This section is generally well written and acknowledges the effects of a very large oil spill.
461-470	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds. This is a much more thorough treatment of the potential effects of an oil spill on marine and coastal birds than is found elsewhere in the document. This section seems to be well-organized and is easy to read. Much of what is listed here applies to the large oil spill scenario as well, and it would be nice to see some version of this presented earlier in the document. This is really the first time sublethal effects, indirect effects, and oil persistence in the environment are discussed in a meaningful way. In fact, there are other things that are not spill-specific that are presented here more carefully than in other sections, or for the first time (a description of Ledyard Bay and Critical Habitat). It would be nice to see some of this incorporated into earlier sections of the document. It would benefit this document to include citations for the general impacts and species-specific

			discussions presented here. If information updated in the biology section of this document (3.2.3) applies to the species discussions in 4.5.5, please make sure to carry it into this discussion.
461	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds. Species. Birds that do not spend time on the surface of offshore and nearshore waters could also be affected by an oil spill if it enters the terrestrial shoreline environment, and the introductory sentence should recognize this (especially given the following paragraph that states birds that would be most affected are species of shorebirds). Direct contact suggests oiling of the bird itself. Effects as a result of food resource contamination are also a significant way birds could be impacted, but this is not generally termed, "direct contact." Please cite the literature that suggests that, "In all cases, long-term recovery is likely, but most species would require more than three generations and access…" Three generations is a long time to experience major effects, particularly in species that are declining (as many Arctic-breeding shorebirds are).
461	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 2 (Offshore Oil). Oil in and on the waters of the Chukchi Sea would be a serious threat to more groups than just seabirds (e.g. seaducks, and possibly phalaropes, could also be affected). You might just use the term, "waterbirds," and define it (waterfowl, seabirds, and shorebirds). The list of impacts is a decent summary that could be presented in earlier discussions of impacts to birds from contact with oil and oiled prey. Wherever this information gets presented in the document thoroughly and for the first time, citations should be included.
464	4.5.5	CPD	Effects of a VLOS, Marine and Coastal Birds, Phase 2 (Offshore Oil, Birds with a Higher Potential for Substantial Effects, Spectacled and Steller's Eiders. Para. 2, lines 10-11. "Mortality could be recovered… within three generations… if eider populations remain stable." COMMENT: This statement is subjective and false. What magnitude of mortality? What reproductive effects on surviving birds? What is one (or three) reproductive "generations"? What are these suppositions based on? I propose the same questions for the Common Eider, page 464, para 3, and Pacific Brant, page 465, para. 2.
464	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 2 (Offshore Oil, Birds with a Higher

			Potential for Substantial Effects, Long-tailed Duck. Long-tailed duck should be in bold type.
464	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 2 (Offshore Oil, Birds with a Higher Potential for Substantial Effects, King Eider. King Eider should be in bold type.
465	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 2 (Offshore Oil, Birds with a Higher Potential for Substantial Effects, Phalaropes. Phalarope population trends for both species are unknown, and there is some evidence they may be declining. Therefore I would not make the statement that they appear stable, and I would use caution drawing conclusions from such a statement.
466	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 2 (Offshore Oil, Birds with a Higher Potential for Substantial Effects, Other Waterfowl and Shorebirds. This section is weak, particularly for a section that falls under Birds with a Higher Potential for Substantial Effects. Please expand on, "key areas of vulnerability," and look for updated information that can be carried forward from Section 3.2.3.
466	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 2 (Offshore Oil, Birds with a Lower Potential for Substantial Effects. First sentence, add the italics, "considerably lower than for seabirds, waterfowl, *and shorebirds* above."
466	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 3 (Onshore Contact). Shorebirds may also come into contact with oiled areas in large numbers during the spring migration, particularly if tundra habitats are not yet free of snow but mudflats at river deltas and lagoons are ice-free.
467	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 4 (Spill Response and Recovery). In addition to the potential impacts of displacement into inferior habitat, Arctic-breeding birds could be affected by displacement that causes them to lose a reproductive season (because they cannot successfully hatch a first clutch and do not have time to raise a second, given the short breeding season OR because human activity creates enough disturbance that clutches are directly affected through crushing or abandonment OR through the indirect effects of predator attraction). There was more detail included in this section for the Large Oil Spill scenario. See comments for earlier sections of the document.
467	4.5.5	MLB	Effects of a VLOS, Marine and Coastal Birds, Phase 5 (Long-term Recovery). Effects don't recover, but the species' populations might…
468-469	4.5.5	MLB	Effects of a VLOS, Marine and Coastal birds, Summer Spill and Winter Spill. These sections were surprisingly readable. Nice job keeping jargon to a minimum.
469	4.5.5	MLB	Effects of a VLOS, Marine and Coastal birds, Conclusion. The conclusion is generally well-organized, readable, and lays out key habitats and species (or groups) that would likely

			experience the highest impacts.
469	4.5.5	CPD	Effects of a VLOS, Marine and Coastal birds, Conclusion. Para. 2-3. COMMENT: The authors mention the value and potential loss of marine birds and T&E species **and then** how Alternatives with shoreline deferral corridors *may offer additional protection to nearshore resources*. But protections offered are inadequate for more offshore species (e.g. spectacled eider and seabirds).
507	4.5.6.3	JB	Pacific Walrus. Regarding the ESA status of the walrus, suggest rewording sentence to say: The Pacific walrus is a candidate for listing under the Endangered Species Act due to the continuing loss of sea ice habitat caused by climate change (76 FR 7634 [Feb 10,2011]).
510	4.5.6.3	JB	Pacific Walrus. Phase 5 (Long Term Recovery) Oil Spill Trajectory Analysis. Good that BOEM has already included the autumn 2014 event near Point Lay reporting about 35,000 walrus hauling out on the U.S. side of the Chukchi. This is the largest reported to date on the U.S. side and apparently reflects the growing trend of more large walrus haulouts on the U.S. coasts during ice-free situations in the Chukchi during late summer.
511	4.5.6.3	JB	Conclusion. Good summary of the numerous areas of Chukchi Sea and coastlines important to walrus that are at particular risk to oil spill.
564-565	4.6	LNS	Unavoidable Adverse Effects; Fish: Adverse effects to the water column would result in adverse impacts to fish through the reduction in prey, ingestion of contaminated prey, direct oiling, etc. which are similar but not the same as water impacts. Also, introduction of invasive species.
565	4.7	LNS	Is the potential for impact to the long-term productivity of fish (or other biotic resource) really only limited to the impacts associated with a VLOS? What about continual, chronic contamination associated with repeated small spills? Or the introduction of invasive species from continual long-term exploration. It seems as though the extent (geographically) is wider over a shorter time span with a VLOS, but continual contamination within a localized, high-use, area also can have long-term impacts to different trophic levels.
593	5.2.5.1	CPD	Analysis of Cumulative Effects, Marine and Coastal birds, Summary of Direct and Indirect Effects. Lines 3-4. COMMENT: This is subjective. What evidence is there for only one year of persistence for a small spill?
593	5.2.5.1	MLB	Analysis of Cumulative Effects, Marine and Coastal birds, Summary of Direct and Indirect Effects. The effects of a large or very large oil spill are missing in this section, and they both have potentially major/population-level effects for a variety of species. Please correct this. I suggest modifying "habitat alteration" to indicate that it could be terrestrial, marine, or

			shoreline habitat that is impacted. Some effects (including those of habitat alteration) are anticipated to last from season to season (e.g. habitat loss as a result of pipeline placement, or avoidance/displacement as a result of offshore platforms or other permanent infrastructure)…
593	5.2.5.2	CPD	Analysis of Cumulative Effects, Marine and Coastal birds, Discussion of Other Relevant Actions. Para. 1, last line. "Some of these factors [causing population declines] have somewhat abated and populations have stabilized (e.g. spectacled eiders, Steller's eiders)….." COMMENT: There is evidence that ACP populations of spectacled and Steller's eiders may have changed little since aerial and ground surveys have begun. Steller's eider productivity has benefited from predator control near Barrow but overall numbers are little changed. Your statement suggests causes of declines have abated and populations have stabilized. What is this statement based on?
593	5.2.5.2	MLB	Analysis of Cumulative Effects, Marine and Coastal birds, Discussion of Other Relevant Actions. Second paragraph: The effects are also causing reduced productivity.
593-594	5.2.5.2	KJK/DBI	Analysis of Cumulative Effects, Marine and Coastal birds, Discussion of Other Relevant Actions. Last sentence of the third paragraph in this section "… and would not have effects that persist from year to year." They have not demonstrated that effects will not persist from year to year. Suggest removing that part of the sentence.
594	5.2.5.3	MLB	Analysis of Cumulative Effects, Marine and Coastal birds, Discussion of Other Relevant Actions. The potential for large spills may also be increasing, especially if offshore/nearshore drilling takes place in Russia (or Canada, according to Section 5.2.5.3). I think this is a reasonably foreseeable possibility. In fact, I think that effects from large and very large oil spills pose the, "greatest source of harm." I do agree that bird strikes with vessels and other infrastructure is also an important source of impacts.
594	5.2.5.3	MLB	Analysis of Cumulative Effects, Marine and Coastal birds, Discussion of Other Relevant Actions. I think it can be reasonably stated that birds that depend on sea ice for some portion of their annual cycle would be negatively impacted by climate change. There should be some mention in this section that Arctic breeding grounds are considered to have a relatively low predator density, which could change with changing climate.
594	5.2.5.3	MLB	Analysis of Cumulative Effects, Marine and Coastal birds, Discussion of Other Relevant Actions. It is not accurate to say that the effects of past and present actions on marine and coastal birds are minor. Many Arctic-breeding marine and coastal species are declining. The causes may

			not be known with certainty, but it is not accurate to describe cumulative effects to these species as "minor" if declines have been noted. It may be fair to say that the cumulative effects of human development and other activities in the Arctic are thought to be minor.
594	5.2.5.3	CPD	Analysis of Cumulative Effects, Marine and Coastal birds, Analysis of Cumulative Impacts. Para. 1, line 3. "The effects of past and present actions on Marine and Coastal birds are minor." COMMENT: This is a subjective statement and historically inaccurate. There are few measures of adverse effects, and those that have been evaluated have been very large with respect to resource damage.
594	5.2.5.3	CPD	Analysis of Cumulative Effects, Marine and Coastal birds, Analysis of Cumulative Impacts. Para. 1, line 6. "These activities [oil and gas exploration and development]… not have effects that persist from year to year." COMMENT: This is subjective, lacks documentation, and is not proven by the facts. [MLB note: I agree, you cannot state that the impacts of increased infrastructure, O&G or other, would not persist from year to year.]
594	5.2.5.3	CPD	Analysis of Cumulative Effects, Marine and Coastal birds, Analysis of Cumulative Impacts. Para. 2, line 7. "The greatest source of harm… are from bird encounters with vessels, platforms, and other structures." COMMENT: Not factual, even for known mortality. Small and large oil spills are, "the greatest source of harm," but are poorly documented.
594	5.2.5.3	CPD	Analysis of Cumulative Effects, Marine and Coastal birds, Analysis of Cumulative Impacts. Para. 3. COMMENT: Omits large oils spills with important one- to multi-year impacts. [MLB note: Agreed, large and very large oil spills are conspicuously absent from the analysis of cumulative impacts.]
594	5.2.5.4	CPD	Analysis of Cumulative Effects, Marine and Coastal birds, Summary/Conclusion. "… impacts to Marine and Coastal Birds anticipated to have a major level of effect. The Proposed Action... would result in a major level effect." COMMENT: This belief that major effects are likely to occur from exploration and development should be clarified elsewhere in the SEIS.
594-595	5.2.5.4	KJK/DBI	Analysis of Cumulative Effects, Marine and Coastal birds, Summary/Conclusion. This section has the same sentence as noted above ("… not have effects that persist from year to year."). I suggest removing this too. This section makes no mention of very large oil spills; they should be included in the cumulative impacts. There is no mention of the effects of a VLOS anywhere here.
595	5.2.5.4	KJK/DBI	Analysis of Cumulative Effects, Marine and Coastal birds, Summary/Conclusion. In the last sentence I suggest adding common and thick-billed murres.

595	5.2.6.1	JB	Analysis of Cumulative Effects. Summary of Direct and Indirect Effects. Polar Bears and Walrus paragraphs. Effects of oil spills not included in analyzed effects.
607	5.2.6.3	JB	Analysis of Cumulative Impacts. Pacific Walrus. Impacts of predicted oil spills not included in analysis.
610	5.2.6.3	JB	Analysis of Cumulative Impacts. Polar Bear. Impacts of predicted oil spills not included in analysis.
Ap A		LNS	Table stating that there have been 35 incidents of small spills recorded over 30 years of offshore exploration in the Beaufort and Chukchi seas; should be included in text with an explanation that predictions for spill assessment are based on primarily **onshore** NS development. There is very little data for **offshore** exploration and none for development/production in Alaskan arctic waters. Northstar and Oooguruk should not be considered "offshore" for production scenario as they are on man-made islands, which is a **very** different scenario than production from a platform. They can be used to assess risks of transport of oil in submerged pipeline, however.

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[By the time this is finalized, might be able to substantiate offshore distribution and hotspots of marine bird activity with: *Provisionally accepted, with revision*s: Kuletz, K.J., Megan C. Ferguson, Brendan Hurley, Adrian E. Gall, Elizabeth A. Labunski, Tawna C. Morgan. Seasonal Spatial Patterns in Seabird and Marine Mammal Distribution In the Eastern Chukchi and Western Beaufort Seas: Identifying Biologically Important Pelagic Areas. *Progress in Oceanography*.]

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Tribal Governments and Alaska Native Organizations

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ALASKA ESKIMO WHALING COMMISSION
P.O. BOX 570 BARROW, ALASKA 99723

December 17, 2014

Walter D. Cruickshank,
Acting Director
Bureau of Ocean Energy Management
U.S. Department of the Interior
1849 C Street, N.W.
Washington, D.C. 20240

RE: BOEM–2014-0078; Supplemental Environmental Impact Statement for Lease Sale 193

Dear Mr. Cruickshank:

The Alaska Eskimo Whaling Commission appreciates the opportunity to submit comments to BOEM on the Supplemental Environmental Impact Statement for Lease Sale 193. We provided testimony consistent with these comments during BOEM's public hearing in Barrow. That testimony is attached here.

The AEWC has informed BOEM, and before it the Minerals Management Service, many times over the past 30 years that our communities support well-managed offshore oil and gas development, undertaken in a manner consistent with our subsistence bowhead whale harvest. Over the course of the offshore industry's work in our waters, our communities have come to recognize the important national priorities associated with this work. And our residents have come to appreciate the potential for this work to bring economic benefit to our remote villages, where unemployment rates are extremely high.

During this time, companies operating in our waters also have learned that those waters provide a very significant portion of our communities' food supply. Just as important for our AEWC villages, the culturally vital bowhead whale subsistence harvest forms the foundation for the social cohesion that makes our communities unique and enables us to thrive.

The AEWC, working with offshore operators and our North Slope Borough, developed and continues to implement the Open Water Season Conflict Avoidance Agreement Process (CAA Process), to enable offshore oil and gas development to co-exist with our bowhead whale subsistence harvest. The success of the CAA Process enables our local leaders, our federal

BOEM-2014-0078-0224

government, and the offshore industry to promote local and national economic priorities without threatening the physical and cultural health of our arctic subsistence communities.

Our AEWC villages support actions by our federal government to give offshore operators the chance to pursue work on the Lease Sale 193 prospects. However, we note that BOEM has identified, in the SIES, the potential for impacts to our subsistence activities from work on those prospects, depending on the level of development. With this, the AEWC very strongly encourages BOEM to fully integrate the AEWC's CAA Process and relevant substantive CAA provisions into its decision making for lease sale stipulations and other matters related exploration and development planning and permitting under Lease Sale 193.

Please contact me at any time if you have questions on these comments or would like to discuss matters addressed in this letter.

Sincerely,

Harry Brower
Harry Brower
Chairman

cc: AEWC Commissioners
Senator Lisa Murkowski
Senator Dan Sullivan
Congressman Don Young
Mayor Charlotte Brower
Tommy Beaudreau
James Kendall

BOEM-2014-0078-0224

Public Comments for Harry Brower, Jr., Chairman,
Alaska Eskimo Whaling Commission
Re: Supplemental Environmental Impact Statement for Lease Sale 193
December 3, 2014

Thank you for the opportunity to comment this evening. My name is Harry Brower, Jr., and I am the Chairman of the Alaska Eskimo Whaling Commission. As BOEM knows, the mission of the AEWC is to preserve and enhance the marine resources of the bowhead whale and its habitat and to protect Eskimo subsistence whaling.

The subsistence hunt of the bowhead whale is the most important subsistence activity for our people, both in terms of food security and for what it means culturally and spiritually to our communities. Our Chukchi Sea villages depend heavily on this resource, and, as ice conditions change over time, it is likely that more of our Chukchi Sea communities will come to rely more on the fall hunt of bowhead whales. AEWC has therefore worked for decades with the federal government and with industry on management of offshore activities to ensure that those activities incorporate mitigation measures that will protect the subsistence hunt of bowhead whales.

The Open Water Season Conflict Avoidance Agreement or CAA is the process that our communities depend on to develop practical mitigation measures based on the traditional knowledge of our whaling captains. Through this process, our whaling captains are able to review industry proposals and to work with the operators to develop measures that work for our hunters and for the offshore operators. The CAA has been very successful over the years in ensuring that offshore activities can co-exist with our pre-existing subsistence uses.

In its 2013 report to the President on energy development and permitting in the Arctic, the Department of Interior commended our efforts with the CAA as a "promising approach to integrate the needs of ecosystems, economies, and cultures."

Moving forward, we strongly encourage BOEM to work with the AEWC and our communities to build off of the CAA in developing site-specific mitigation measures for planned exploration and development activities. We raise this point now because BOEM concludes in the supplemental EIS that offshore activities under Lease Sale 193 could have major impacts from disruptions of our hunting activities and degradation of subsistence use areas. These types of impacts are prohibited by federal law based on the protections for our subsistence uses in the Marine Mammal Protection Act. Therefore, BOEM must be at the table, working with our hunters, industry and NMFS to support the CAA process.

An important step that BOEM could take right now is coordinating its review of site-specific projects to be consistent with the timing of the annual CAA process. Operators that are not already working with us must be encouraged to talk directly with our whaling captains through the CAA process. And BOEM should incorporate the mitigation measures from the CAA into its decisions. Simple, practical solutions like these can go a long way towards ensuring that offshore activities do not interfere with our subsistence uses. Our food security and our subsistence-based culture and traditions depend on it.

BOEM-2014-0078-0224

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BOEM-2014-0078-0278

Arctic Iñupiat Offshore

Bureau of Ocean Energy Management
ATTN: Walter Cruickshank, Acting Director
SUBJECT: Draft Second SEIS for Lease Sale 193
1849 C Street, NW
Washington, D.C. 20240

Via the Federal eRulemaking Portal
http://www.regulations.gov

December 22, 2014

Re: Comments on the Lease Sale 193 Draft Second Supplemental Environmental Impact Statement

Arctic Iñupiat Offshore LLC (AIO) appreciates the opportunity to comment on the Bureau of Ocean Energy Management's (BOEM) Draft Second Supplemental Environmental Impact Statement for Lease Sale 193 (DSSEIS). AIO is a privately held corporation established to promote sustainable economic development within the Arctic Slope region. AIO is comprised of Arctic Slope Regional Corporation, Tikigaq Corporation, Olgoonik Corporation, Ukpeaġvik Iñupiat Corporation, Atqasuk Corporation, Nunamiut Corporation and Kaktovik Iñupiat Corporation and was formed to hold an equity interest in some of the leases acquired by Shell Gulf of Mexico Inc. (Shell) in Lease Sale 193.

AIO's comments on the Draft Second Supplemental for the Lease Sale 193 EIS will be short. Since Lease Sale 193 has been in litigation since the 2008 lease sale there is a large volume of data and information available to the general public for review, AIO has only focused on the changes in the DSSEIS since the 2011 Lease Sale SEIS. In a January 22, 2014 opinion the Ninth Circuit Court (Court) found that reliance on a one billion barrel estimate of total economically recoverable oil in the Final Environmental Impact Statement for Lease Sale 193 was arbitrary and capricious. While the Court upheld the original NEPA analysis in its opinion it decided to remand to the District Court which remanded to BOEM a requirement to supplement the Lease Sale 193 EIS with missing information related to the effects of a larger than one billion barrel minimum field size development.

As part of the supplemental information, BOEM needed to address the deficiency by analyzing the environmental effects of a higher production scenario. BOEM created an Exploration and Development Scenario (EDS) for analysis under the DSSEIS. The EDS has an Anchor Field of 2.9 billion barrels of reserves with an associated Satellite Field of 1.4 billion barrels of reserves resulting in a total of 4.3 billion barrel development. The Court also required BOEM to review a

Arctic Iñupiat Offshore, LLC • 3900 C St. Ste. 1003, Anchorage, Alaska 99503 • (907) 334-0600

BOEM-2014-0078-0278

Arctic Iñupiat Offshore

development scenario that transitions from oil production to gas production over its life. The life span for the new development scenario used by BOEM is 77 years, from exploration to decommissioning, including the development and construction pipeline access for both oil and gas.

Following development of the EDS, BOEM identified the relevant environmental issues and evaluated the expected direct, indirect and cumulative impacts associated with the new EDS. AIO believes that BOEM has taken a robust and thorough approach to its analysis of the EDS. BOEM determined the most likely outcome for production from Lease Sale 193 is 'zero' however it developed the EDS with a 4.3 billion barrel development to satisfy the purpose of the remand.

In order for AIO to evaluate the results of new environment information and data BOEM included in its analysis of the EDS; AIO suggests that BOEM describe in more detail in the Final Second Supplemental EIS (FSSEIS) the significance of the new information and data and expand on how it supports the BOEM's conclusions. Having this additional new research, information and data made available and better highlighted can only assist the public in its understanding of the result of the DSSEIS.

AIO believes that BOEM has fulfilled the requirements of the 9th District Court remand by adding the above information and production scenario into the Lease Sale 193 EIS and supports the Proposed Action to reaffirm Lease Sale 193.

Thank you for the timely release of the DSSEIS for review. AIO encourages the BOEM to move quickly toward drafting the Final Second Supplement.

Best Regards,

Teresa Imm
General Manager
Arctic Iñupiat Offshore LLC

BOEM-2014-0078-0025

Aleut Corporation

November 25, 2015

Walter D. Cruickshank, PhD
Acting Director, Bureau of Ocean Energy Management
BOEM, Alaska OCS Region
380 I Centerpoint Drive Suite 500
Anchorage, Alaska 99503-5823

Re: Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 – Public Comment

Dear Dr. Cruickshank,

As President of the Aleut Corporation, born and raised in King Cove and an original Aleut and King Cove Corporation shareholder, I am uniquely qualified to comment on the Bureau of Ocean and Energy Management's Draft Supplemental Environmental Impact Statement (SEIS) for the Chukchi lease sale 193.

Many outsiders believe that as indigenous people of the Arctic – we need to be saved. We will not put up with that. Not only do we not need saving, but we want to take the lead on Arctic development and seize the opportunity for sustainable Arctic development that will increase long-term opportunities in our region. Offshore drilling in the Chukchi is of critical importance to our people and our region.

I'm writing to express my strong support for the Draft SEIS and ask that BOEM swiftly issue a Record of Decision that will allow companies to explore and develop in the Chukchi Sea in 2015. I'm asking BOEM to meet its deadline for approval by March 2015 and avoid any actions that would preclude that goal.

The stakes for Alaska and the nation are high. Fifty-five thousand jobs, a $145 billion dollar payroll, $200 billion in the federal treasury and 700,000 new barrels of oil through the Alaska Pipeline, all hang in the balance. I am confident companies have developed practices and technologies to drill safely.

Thank you for the opportunity to comment on the Draft SEIS. Please issue a Record of Decision within your stated timeline so that companies can begin operations in 2015.

Sincerely

Thomas Mack

Thomas Mack
President

One Aleut Plaza, 4000 Old Seward Highway, Suite 300, Anchorage, Alaska 99503 | Ph: 907.561.4300, 800.232.4882 | Fax: 907.563.4328 | www.aleutcorp.com

BOEM-2014-0078-0069

Aleut Corporation

December 9, 2014

Walter D. Cruickshank, PhD
Acting Director, Bureau of Ocean Energy Management
BOEM, Alaska OCS Region
380 I Centerpoint Drive Suite 500
Anchorage, Alaska 99503-5823

Re: Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 – Public Comment

Dear Dr. Cruickshank,

As Chief Executive Officer of the Aleut Corporation with *25 years of professional background focused on a combination of leadership positions mostly tied directly to Alaska's oil and gas industry, government and the Native community,* my comments on the Bureau of Ocean and Energy Management's Draft Supplemental Environmental Impact Statement (SEIS) for the Chukchi lease sale 193 are uniquely informed.

Specifically, 14 of those years were spent working for NANA Development Corporation, including six years as the Board Chair of North Star Gas. (A fuel distributorship co-op owned by 16 village and two regional corporations located in Western, Alaska).

Most recently, I have been the Executive Director of the Alaska Process Industry Career Consortium, which offers secondary and post-secondary career and technical educational opportunities within the process technology oil/gas and mining industries.

It is from this perspective and background that I will help guide the Aleut Corporation in our pursuit to take the lead on Arctic development that will increase long-term opportunities in our region. Offshore drilling in the Chukchi is of critical importance.

I'm writing to express my strong support for the Draft SEIS and ask that BOEM swiftly issue a Record of Decision that will allow companies to explore and develop in the Chukchi Sea in 2015. I'm asking BOEM to meet its deadline for approval by March 2015 and avoid any actions that would preclude that goal.

The stakes for Alaskans, especially the people of the Arctic, and the nation are high. Fifty-Five thousand jobs, a $145 Billion dollar payroll, $200 Billion in the federal treasury and 700,000 new barrels of oil through the Alaska Pipeline, all hang in the balance. I am confident companies have developed practices and technologies to drill safely.

Thank you for the opportunity to comment on the Draft SEIS. Please issue *a* Record of Decision within your stated timeline so that companies can begin operations in 2015.

Sincerely

Matthew Fagnani
CEO

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NANA DEVELOPMENT CORPORATION

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December 22, 2014

Walter D. Cruickshank, PhD
Acting Director, Bureau of Ocean Energy Management
BOEM, Alaska OCS Region
380 I Centerpoint Drive Suite 500
Anchorage, Alaska 99503

RE: Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193- Public Comment

Dear Acting Director Cruickshank,

NANA Development Corporation supports moving forward on the approval of the Second Supplemental Environment Impact Statement. We are writing to ask that the process of allowing oil and gas exploration in the Chukchi Sea proceed immediately and not be further prolonged.

This issue is particularly important to us. As the Native people who live along the southern reaches of the Chukchi Sea, the development of oil and gas resources will have a direct impact on our lives, land, and communities. We support responsible resource development because we understand that it is vital to our region, to the economy of Alaska, and to our nation. In rural Alaska, with little infrastructure and industry, offshore development would mitigate the impact of high unemployment. It would help sustain rural populations by providing jobs and long term careers in a region with unemployment rates more than double the national average.

However, NANA believes that all development must be done responsibly, safely, and in cooperation with the people most impacted by the Chukchi Sea's exploration and development. NANA knows that properly planned and managed oil and gas exploration on the outer-continental shelf can minimize adverse impacts and harm to the delicate Arctic marine on and offshore environments.

NANA Development Corporation is well positioned to join with oil producers in this endeavor. It is imperative that any production work be done with companies like ours, with industry expertise and local and traditional knowledge. Local hire of our shareholders is essential, as is engagement and involvement of our communities. Success in the Arctic for the oil and gas industry can only be achieved by true collaboration with local resources.

NANA Development Corporation, representing over 13,000 Alaska Native shareholders, has a diverse portfolio of businesses. We own the country's largest Native American-owned architectural and

BOEM-2014-0078-0233

engineering firm. Our joint venture, NANA WorleyParsons, is one of the largest oilfield engineering firms in Alaska. We also have the honor of providing a multitude of capabilities to the United States government, from servicing Air Force One to supporting Lawrence Livermore National Laboratory.

However, fundamentally, we are a resource development company. NANA got its start in business over forty years ago by supporting early oil and gas development on the North Slope. In the 1980's, NANA was one the owners of the Endicott oilfield. We participated in the building of oil and gas offshore facilities and supported its production. That experience helped us during the development of the Red Dog Mine, located 100 miles above the Arctic Circle. Red Dog is a world-class zinc mine that provides hundreds of jobs and millions in salaries to our shareholders and other Alaskans. Over 1.1 million tons of Red Dog's zinc concentrate is shipped from a port that we built and operate in Arctic waters. Resource development in the Arctic is challenging. We know that it can be done safely and with minimal environmental impact, as we've done for over twenty-five years at Red Dog Mine.

It is from this vantage point of responsible resource development, creating jobs, and providing opportunities for our shareholders, that we at NANA Development Corporation encourage the Bureau move forward without delay in issuing a Record of Decision to approve the SEIS by March 2015.

Thank you,

Helvi K. Sandvik
President

Doing Business for 10,000 Years

NANA

December 22, 2014

Walter D. Cruickshank, Ph.D.
Acting Director, Bureau of Ocean Energy Management
BOEM, Alaska OCS Region
380 I Centerpoint Drive Suite 500
Anchorage, Alaska 99503

RE: Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193- Public Comment

Dear Acting Director Cruickshank,

NANA Regional Corporation supports moving forward on the approval of the Second Supplemental Environment Impact Statement.

NANA supports exploration, development and production on the outer-continental shelf if done in a responsible manner. In rural Alaska, with little infrastructure and industry, offshore development would mitigate the impact of high unemployment. It would help sustain rural populations by providing jobs and long term careers in a region with unemployment rates more than double the national average.

However, NANA believes that all development must be done responsibly, safely, and in cooperation with the people most impacted by the Chukchi Sea's exploration and development. NANA knows that properly planned and managed oil and gas exploration on the outer-continental shelf can minimize adverse impacts and harm to the delicate Arctic marine on and offshore environments.

NANA Regional Corporation would like to stress that subsistence foods and resources are essential to the Iñupiat way of life, to the health and well-being of NANA shareholders, and must be protected.

Moving forward we ask that exploration and development companies consult with and employ traditional knowledge-holders in the formation of plans and in carrying out monitoring activities, and shall incorporate such traditional knowledge in plans and activities in order to minimize impacts to the land, water, air and subsistence resources. In consultation with NANA region organizations, a subsistence advisory council could also be formed.

NANA does have extensive experience through our partners shipping in the Arctic. The Red Dog Mine is a world-class zinc mine that provides hundreds of jobs and millions in salaries to our shareholders and other Alaskans. Over 1.1 million tons of Red Dog's zinc concentrate is

shipped from a port that we built and operate in Arctic waters. In 2014, 24 Handy and Panamax ships sailed safely to ports around the world. Resource development in the Arctic is challenging. We know that it can be done safely and with minimal environmental impact, as we've done for over twenty-five years at Red Dog Mine.

We trust NANA communities, with particular emphasis on coastal communities, will have meaningful input and involvement in the formation of plans for exploration, development, production, response plans, and closure. Assuming such cooperation, we support the Bureau issuing the Record of Decision.

Thank you,

Lance Miller, Ph.D.
VP Natural Resources
NANA Regional Corporation

NANA Regional Corporation, Inc. • P.O. Box 49, Kotzebue, Alaska, 99752 • T: (907) 442-3301, (800) 478-3301 • F:(907) 442-4161 • nana.com/regional

Olgoonik Corporation

December 17, 2014

Re: OCS EIS/EA
BOEM 2014-653
Chukchi Sea Planning Area
Oil and Gas Lease Sale 193

Michael Routhier
Program Analysis Officer and Program Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

Dear Mr. Routhier:

Olgoonik Corporation is the Alaska Native Claims Settlement Act (ANCSA) village corporation for the Native village of Wainwright, Alaska. We own over 175,000 acres of surface estate lands surrounding the village of Wainwright. Wainwright, Alaska is one of four communities on the Chukchi Sea coast and one of two villages closest to this proposed oil and gas lease sale BOEM is currently taking comments on in its second supplemental Environmental Impact Statement. Wainwright is a community that relies heavily on subsistence; gathering our traditional foods from both the ocean and lands. We view the Chukchi as our garden. Being one of approximately 200 ANCSA corporations, we, like all other village corporations, have the responsibilities to our shareholders to oversee social and economic well-being of our people, culture and resources. Wainwright, Olgoonik Corporation and our shareholders will be forever impacted with oil and gas exploration and development in the Chukchi Sea.

Oil and gas development will bring both encouraging and the potential for harmful effects to our lands and our people. Oil and gas exploration and development in the Chukchi will provide Olgoonik Corporation businesses the opportunities to prosper economically and bring jobs and other opportunities for our shareholders. However, it will affect our subsistence way of life. Especially with an oil spill which this environmental impact statement has stated that it expects and plans for, two major spills. As with public testimony that BOEM has received in Wainwright and other public meetings around the state of Alaska; we, too, are concerned with this potential and how monitoring and clean-up will be addressed should such a

BOEM-2014-0078-0197

catastrophe happen. Should such a spill occur and reach the shores of Chukchi Sea, it will be our lands that will be damaged. We expect to be informed, consulted and continually debriefed, and included on decision making in clean-up efforts, both onshore and offshore by all governmental agencies from the time a spill occurs no matter what the magnitude is as stated in this EIS/EA

Olgoonik Corporation supports BOEM's alternative III with the exception of vacating the five current leases within Corridor I. The United States has already conducted these leases taking a lot of effort to conduct the leases and take funds from successful bidders which will need to be repaid when vacated and the leaseholders have invested a lot of money, time, resources and efforts to explore and develop their business efforts to locate oil and gas. These leaseholders should be allowed to continue forward with their leasehold interest under watchful eyes of all stakeholders to determine whether and when this deferred area should be allowed to drill, if ever.

BOEM has allowed limited time to review and comment to a 45 day comment period. We have not fully conducted a review of the two volume, 655 page plus document. I am sure we will have many more concerns on the environment assessment as BOEM works through the leases with the leaseholders.

Sincerely,

Hugh Patkotak
CEO
Olgoonik Corporation

December 22. 2014

Michael Routhier, Project Manager
U.S. Department of the Interior
Bureau of Ocean Energy Management
Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5820

Walter D. Cruickshank, Ph.D.
Acting Director, Bureau of Ocean Energy Management
1849 C Street, NW
Washington, D.C. 20240

Submitted electronically via regulations.gov

Re: State of Alaska Comments on the BOEM Chukchi Sea Planning Area, Oil and Gas Lease Sale 193, Draft Second Supplemental Environmental Impact Statement

Dear Sirs:

The State of Alaska has reviewed the Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area Oil and Gas Lease Sale 193.

The Draft SEIS was prepared in response to the April 24, 2014 remand from the Alaska District Court and addresses the deficiencies disclosed in the January 2014 opinion of the U.S. Court of Appeals for the Ninth Circuit. The current SEIS version includes a new exploration, production and development scenario, updated affected environment, revised impact analyses, mitigation associated with proposed alternatives, and more.

We recognize BOEM's very hard work on the Draft SEIS, necessary to produce this improved and updated document in such a timely and comprehensive manner. As a cooperating agency, the State of Alaska has appreciated BOEM's extended efforts to maintain robust outreach among participating agencies, stakeholders, and the public to help make improvements and further develop the Draft SEIS. We appreciate BOEM's incorporation of the input provided by the State's subject matter experts, to date. Ultimately, this effective outreach and agency consultation has enhanced the efforts to update the impact analyses given the new exploration and development scenario provided in the current version SEIS.

In particular, BOEM has done a thorough and detailed job revising the exploration and development scenarios, which as we understand, directly addresses the Ninth Circuit Court's concerns and adequately describes the assumption of one satellite facility in addition to the

anchor field with updated resource assessments and development trends. This updated analysis is based on the known geologic structures in the region and adequately incorporates a summary description of likely exploration, development and production activities that could occur in the 193 Lease Sale Area.

We recommend BOEM transition more clearly between SEIS sections particularly to describe a reasonably complete discussion of possible mitigation measures. Mitigation is addressed in Section 2.3 and appears multiple places throughout the EIS, notably in Section 4 where possible or expected mitigation measures are discussed. However, BOEM should clearly identify these mitigation measures and explain how, or if, they are factored into conclusions regarding effects. In addition, BOEM should better explain how the mitigation measures that were previously identified in the 2007 FEIS and 2011 SEIS are applicable now and sufficient under the new expanded scenario in the current EIS document. It would be helpful if BOEM provided an Impacts Summary table and significance threshold criteria similar to what was provided in past EIS documents for Lease Sale 193.

In closing, we respectfully remind BOEM of Alaska's tremendous stake in the timely progress and successful completion of leasing, exploration, and development of the Arctic Outer Continental Shelf (OCS). In a study conducted by the University of Alaska Anchorage Institute of Social and Economic Research (ISER), the Alaska economy would be sustained by the addition of 35,000 jobs with a $72 billion payroll over a 50-year period as a result of Alaska OCS development. Development of the OCS would spin off approximately $5.8 billion in additional state and local revenues. OCS development is a prime source of the continued health and diversity of our onshore oil industry as well. Production from the OCS has several indirect effects including lower pipeline tariffs and longer life of the TAPS pipeline, a more robust and lower cost service industry, and longer-lived onshore facilities.

Development of the OCS would greatly help secure our nation's energy needs where it is estimated to contain 27 billion barrels of conventional oil and 132 trillion cubic feet of natural gas. Studies have shown that Alaska's Beaufort and Chukchi Sea development could result in the production of 700,000 barrels of oil per day for 40 years, in-turn supplying more jobs, incomes, and energy for our state and nation. For these reasons, we encourage the continued timely completion of this EIS process and urge the Secretary to affirm the Chukchi Sea 193 Lease Sale.

We appreciate the opportunity to review the Draft Second SEIS. Please contact me if you have any questions regarding our comments at (907) 269-8732 or sara.longan@alaska.gov. We look forward to continue supporting BOEM as the agency works towards developing the Final EIS.

We provide more detailed SEIS section and page specific comments in the Enclosure.

Sincerely,

Sara Longan, Ph.D., Director
Office of Project Management and Permitting

Enclosure: State of Alaska Comments on the Draft Second Supplemental EIS BOEM Lease Sale 193 Chukchi Sea

Section Number	Page	Original Language	Proposed Language or Comment
2.5.1	37	The summary of impacts for Alternative 1 discusses the impacts of large oil spills on water quality, fish, marine mammals, vegetation and wetlands.	Please describe at which phase the large oil spills are expected to occur. Are these spills during the exploration, development or production phases outlined in the document?
3.3.2	100-105	Figure 3-15 provides an overview of all the communities that may be affected by leased area activities	Prudhoe Bay / Deadhorse is included in Figure 3-15, but is not included in the text description contained in pages 101-105. If Prudhoe Bay /Deadhorse is not going to be included in the text descriptions there should be an explanation of that in Figure 3-15, otherwise there should be at least a brief discussion in the text description.
3.3.4	141	The discussion of environmental contaminants at the bottom of page 141 discusses the EPA's NPDES program at length. The discussion further notes that "*These regulations and associated permits assist in protecting human health and the environment for residents of the North Slope.*"	The discussion should also include mention that the State of Alaska has been delegated authority for all the same discharges in State waters out to three miles. While the EPA has regulatory authority in the OCS, it should be made clear that the State of Alaska has primacy for the program in State waters and in onshore areas.
Section 4	General		BOEM should provide a summary table of all updated information sources

			utilized and referenced in the current version EIS.
Section 4	General		The terminology used for NEPA conclusions is inconsistent among evaluated resources. In some instances "intermediate" is used within a temporal context. The marine mammals section discusses effects, further delineated by "effects by species," but it is not clear if these conclusions are also in a temporal context. BOEM should employ a consistent or standard format throughout.
4.1.3	155-158	This section provides an analysis and summary of effects broken into five distinct periods in the 77-year life of oil field development and production.	There is no clear delineation of where in the different phases (exploration, development, production) that a large oil spill will occur. Spills are discussed in later sections, but are buried in the details. A threshold criteria and definition of effects should be included, similar to what was provided in previous EIS documents for Lease Sale 193.
4.2	159	The discussion in paragraph two noted that BOEM considered the approaches of other federal agencies in developing the impact scale on page 158. The paragraph further cites the *Draft SEIS on the Effects of Oil and Gas Activities in the Arctic Ocean (NMFS, 2013a)*	It is not clear why a draft SEIS is cited as a source for reasonable approaches for development of an impact scale. The original draft NMFS EIS was issued in 2011, but a FEIS has yet to be issued. Draft EIS documents should not be relied upon in this EIS document.
4.3.1.1	163	Paragraph four on page 163 refers to water withdrawals from the nearshore environment, but does not explain the context of water withdrawals for ice road, ice pad and ice bridge construction.	If these water withdrawals are related to proposed pipeline construction once OCS development begins, it should be stated more clearly.
4.3.2	172	Impact Producing Factors are discussed in this section, including emissions from routine operation of vessels, drill rigs, aircraft, and onshore infrastructure, as well as evaporative emissions from accidental oil spills and natural gas	Only those effects that are reasonably foreseeable should be considered when determining the significance of environmental impacts. Given the low probability of oil spills, it is not clear how air emissions from routine operations which are reasonably foreseeable can be discussed in combination with evaporative emissions from accidental oil spills, which are not reasonably foreseeable. Later discussions in this document state that the probability of a Very Large Oil Spill (VLOS) are "extremely unlikely."

		releases.	In addition, it appears that emissions from exploration drilling units are being addressed as impact producing factors in combination with evaporative emissions from oil spills and natural gas releases. It is not clear how these emissions can be considered in combination since the drilling unit emissions would occur in the exploration phase and according to Table 4.3 the large spills are assumed to occur in the development and production phase. These two emissions are temporally distinct and it should be made clear that these are not cumulative impacts since they are separated in time and the emissions from the exploration drilling phase would have dispersed before the development and production stages years later.
4.3.2	173	Aircraft emissions are discussed	It is not clear why aircraft emissions are discussed here since the regulation of aircraft emissions does not rest with BOEM. It should be noted which agency has direct regulatory authority over flight operations and air emissions.
4.3.2	175	Evaporative Emissions are discussed on page 175 – 177	It is not clear why emissions from speculative oil spills are being discussed in the same section as projected air emissions from OCS exploration or production activities. It should also be made clearer in the discussion at which phase in the 77-year scenario these evaporative emissions would be occurring.
4.3.2	179-181	This section discusses the impact of the scenario through time.	It is not clear whether this discussion addresses onshore impacts, nearshore impacts, offshore impacts or some other combination of those areas. A simple clarification of which areas are being addressed would be helpful. BOEM should note in this discussion that their air quality modeling approach here is extremely conservative. The Gaussian dispersion equation presented in this discussion would greatly overestimate the actual onshore air quality impacts. Gaussian modeling techniques are relatively simple tools for estimating air quality impacts. However they do not account for

			changing meteorological conditions and increased dispersion that typically occurs with plume travel. Gaussian models provide reasonable estimates within 50 km of a source, but substantially overstate the impacts at further distances. The source to shore distances associated with this lease sale are substantially greater than 50 km. Therefore, using a Gaussian technique to estimate onshore air quality impacts provides extremely conservative (ie. overstated) results.
4.3.2	184	The predicted impacts do not consider the use of ultra-low sulfur diesel (ULSD).	It is not clear why the use of ULSD is not considered since the use of that fuel is required for those vessels operating in state waters. Supply vessels and drilling vessels that enter state waters at Dutch Harbor or other ports would be required to use ULSD.
4.3.2	186-189	These pages describe potential oil spills that could occur during the exploration, development and production phase (years 10-25)	It is not clear why the mitigating effects of spill response are not considered and discussed, but the detrimental effects of spill response (in situ burning and spill response vessel emissions) are discussed in detail. It should also be noted in this section that the Alaska Regional Response Team has adopted the latest version of DEC's In Situ Burning Guidelines (2008).
4.3.2	188	The final paragraph on page 188 notes "*However, when taking into account emissions from response activities related to an oil spill, particularly a large spill, the severity may increase to a moderate impact.*	The discussion in the prior comment also applies here as well.
4.3.7	253	The final paragraph notes "*Although it is illegal, the discharge of oily sludge, garbage, and other debris from commercial vessel traffic could pose significant risk to ringed seals because these types of pollution are*	This sentence could be clearer. It is comparing an illegal discharge with an illegal discharge and should be better explained.

		more common and widespread than accidents or illegal discharges.	
4.3.13	366	The final paragraph on page 370 notes "*Discharges have the potential to affect public and community health by contaminating water and food.*"	It is not clear how this statement can be justified without further detail or discussion. EPA's discharge standards are designed to be protective of human health and designated uses. Is this sentence talking about permitted discharges or illegal discharges?
4.4.1	414	Paragraph two discussed in detail the **Upcoming Regulatory Reform for the Arctic.** It is not clear why this discussion does not include mention of the spill response standards already in place.	The State of Alaska spill response standards are more stringent than federal standards in the following areas: • Prompt deployment: AS 46.04.030(1) • Seasonal drilling 18 AAC 75.425(e)(1) • Realistic maximum response operating limitations 18 AAC 75.425(e)(3)(D) and 18 AAC 75.445(f) • Response planning standard volumes 18 AAC 75. 434(a)-(d) and 18 AAC
4.6	565	The last sentence in the discussion of Unavoidable adverse impacts notes "*A VLOS is not considered in this section because it is extremely unlikely and the adverse effects from one are not considered "unavoidable".*	Why are oil spill emissions considered in the air quality discussions in the same category as fixed facility emissions if an oil spill is extremely unlikely?

ALASKA STATE LEGISLATURE

REPRESENTATIVE
SHELLEY HUGHES

Economic Development
Trade and Tourism Committee
Chairman
Energy Committee
State Affairs Committee
Military & Veterans' Affairs Committee
University Finance Subcommittee
Fish & Game Finance Subcommittee

HOUSE OF REPRESENTATIVES
District 8 – Greater Palmer

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housemajority.org

Bureau of Ocean Energy Management
Office of Public Affairs
1849 C Street, NW
Washington, D.C. 20240

December 22, 2014

RE: Support for SEIS Approval for Lease Sale 193

To Whom It May Concern:

I am writing to urge the Bureau of Ocean Energy Management to finalize the Supplemental Environmental Impact Statement for Lease Sale 193, reaffirm Lease Sale 193, and allow exploration to proceed in Alaska's OCS. Please know that I the support for access to fair permitting processes for the 680 and counting leaseholders in Alaska's OCS. Exploration and production in Alaska's waters provides an opportunity for what will undoubtedly be an incredible revenue source not only for the state of Alaska, but the entire nation.

Two studies conducted by University of Alaska's Institute of Social and Economic Research and Northern Economics examining the possible economic impact of OCS exploration and production. The first study, in 2009 found that new offshore energy production in the state of Alaska would produce an annual average of 35,000 jobs – both directly and indirectly tied to the industry – over the next 50 years in Alaska alone, with a total payroll of $72 billion over those 50 years.

The follow-up study in 2011 estimated that the jobs and revenue impact of Alaska OCS development in the Beaufort and Chukchi Sea could generate an annual average of 54,7000 jobs nationwide, with an estimated cumulative payroll amounting to $145 billion over the next 50 years.

In addition to tens of thousands of new, family-wage jobs, production in the Chukchi and Beaufort could amount to $193 billion in revenues to federal, state, and local governments over the same 50 year period. Revenues and job creation of this magnitude cannot be taken lightly, especially in the current economic climate.

The current leaseholders in Alaska's OCS have waited for over five years, while footing the bill for applications for permits, environmental studies and analysis, and more than $3 billion in bonus payments to the federal government. Throughout this lengthy process, not one well has been drilled to

BOEM-2014-0078-0275

hydrocarbon. It is time for the government to fulfill its obligation to those lease holders and begin processing permits within a reasonable time period.

Alaska and its waters are not only home to a wealth of natural resources, but to a prime and competitive location for shipping and trade in the emerging Arctic market. In order to keep pace with nations like Russia, which is in the process of investing over $9 billion in their effort to dominate these Northern waters, we must step up to the plate and act now. Russia currently has over 41 icebreaker vessels in operation and production phases, while the U.S. has only five. OCS exploration in Alaska's Chukchi and Beaufort Seas is an excellent start to ensuring that the United States plays a major role in the Arctic trade economy.

Please do what is best for our nation and finalize the SEIS for Lease Sale 193.

Sincerely,

Shelley Hughes

Representative Shelley Hughes

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North Slope Borough

OFFICE OF THE MAYOR

P.O. Box 69
Barrow, Alaska 99723
Phone: 907 852-2611 or 0200
Fax: 907 852-0337

Charlotte E. Brower, Mayor

December 22, 2014

Walter D. Cruickshank
Acting Director
Bureau of Ocean Energy Management
1849 C Street, NW
Washington, D.C. 20240

James Kendall
Alaska Region Director
Bureau of Ocean Energy Management
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503–5823

via http://www.regulations.gov

RE: Oil and Gas Lease Sale 193, Draft Second Supplemental Environmental Impact Statement, Docket ID: BOEM–2014–0078

Dear Dr. Cruickshank and Dr. Kendall,

Thank you for the opportunity to offer written comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. "BOEM has prepared a Draft Second SEIS for Lease Sale 193 in accordance with the April 24, 2014 remand order of the District Court. The Draft Second SEIS addresses the deficiencies identified in the Ninth Circuit opinion by analyzing the potential environmental effects of potential oil and gas activities associated with Lease Sale 193 based on a new exploration and development scenario."[1]

About the North Slope Borough

The North Slope Borough (Borough or NSB) is the regional municipal government for eight communities across the North Slope of Alaska. Our Borough is the largest municipality in the United States in terms of landmass. It is the regional government for the eight villages within the 89,000 square miles of the Alaskan Arctic, north of the Brooks Mountain Range to the Arctic

[1] 79 Fed. Reg. 66401, 66402.

Ocean. The 2011 populations of our villages ranged from under 300 in Pt. Lay to just over 4,800 in Barrow, the seat of our Borough government and the northernmost community in the country. In total we have approximately 7,840 residents, of which nearly 70 percent are Iñupiat.

Our residents depend on subsistence resources for their physical and cultural health. Traditional foods are far more nutritious than many types of imported "store-bought" food, and their continued consumption has repeatedly been shown to be critical to the health of our people.[2] The social fabric of our communities revolves around subsistence traditions. All of our communities, whether through direct harvest or extensive sharing networks, utilize the full range of traditional marine subsistence resources that abound in arctic waters. Any threat to subsistence resources is a threat to the continued viability of our communities and the Iñupiat culture.

The North Slope Borough is supportive of oil and gas exploration within the area encompassed by Lease Sale 193, provided the activities are conducted in manner that is safe for the environment and does not impact subsistence activities or resources. Those subsistence activities and resources form the foundation for meeting the nutritional and cultural needs of our North Slope residents.

As stated in the Notice for the Request for Information and Comments on the Preparation of the 2017–2022 Outer Continental Shelf (OCS) Oil and Gas Leasing Program, "[o]ffshore exploration in the Arctic must occur in a way that is safe, responsible, and respectful of the Alaska Native communities that depend on the ocean for subsistence."[3] We could not agree more.

Prevention and Spill Response

The development of the draft SEIS has been in response to a series of federal court decisions requiring additional analysis beyond what was contained in the underlying 2007 Final EIS. This latest document specifically considers a larger potential amount of producible oil within the lease sale area than was evaluated in the initial EIS, and an associated potential for higher levels of exploration and production activity. These larger estimates translate into a greater oil spill risk. The Borough has consistently argued that if oil and gas leasing and operations are allowed to occur in the Alaskan Outer Continental Shelf, they must be subject to the highest standards of environmental protection, including oil spill prevention and response preparedness.

Prevention must be the priority. Where spilled oil is difficult to clean up adequately in any marine environment, oil spill response poses far greater challenges in the cold, dark, icy and remote waters of our Chukchi Sea.[4] The challenges posed by the climate must be considered as

[2] The subsistence diet protects against obesity and diabetes, and associated problems such as hypertension and cardiovascular disease. Restricted access to subsistence foods therefore places the community at increased risk for these problems. If subsistence use in the region is reduced, very significant increases in obesity and diabetes in the impacted communities would predictably ensue. *See* Ebbesson SO, Kennish J et al, Diabetes is Related to Fatty Acid Imbalance in Eskimos, *International Journal of Circumpolar Health*, 58: 108-119. 1999); Shephard R and Rode A, The Health Consequences of Modernization: Evidence from Circumpolar Peoples, Cambridge University Press (1996).

[3] 79 FR 34350.

[4] *See* NATIONAL RESEARCH COUNCIL, RESPONDING TO OIL SPILLS IN THE U.S. ARCTIC MARINE ENVIRONMENT,

an important factor for decisions related to timing of exploration and drilling operations.

While prevention must be the paramount goal, all levels of government, the oil companies, and affected communities need to be fully prepared to respond in the event of a spill. Additional infrastructure for spill response is needed in all of our Chukchi Sea coastal communities. Because our residents will be among the first responders if there is a spill, our residents need the best training and equipment to ensure their safety as they help prevent damage to the marine environment, and especially to the fish and wildlife resources that sustain us.

In addition, many questions remain about the use of dispersants in the Arctic. We have attached detailed comments we provided to the Alaska Regional Response Team (ARRT) on the use of dispersants. We look forward to seeing the draft proposed regulations for offshore drilling in the Arctic.

Deferral Areas

As we have explained many times before, to assure an opportunity for the safe pursuit, harvest, and retrieval of bowhead whales, a combination of two areas must be protected from noise and other industrial disturbance. First, there are the offshore areas within which subsistence activities are conducted. This is more than simply the area defined by harvest locations over time, but also includes areas of pursuit. Second, there are the areas outside of the use areas "upstream" in the migratory path of bowhead whales within which industrial activity or marine discharges could deflect whales beyond the safe reach of "downstream" subsistence hunters. Put another way, the goal is to prevent alteration in the distribution of whales and other resources to such a degree that they become unavailable for the safe harvest by the subsistence community.

In the Chukchi Sea Planning Area, BOEM has defined a 25-mile coastal buffer within which no leases will be sold. This deferral area is a good start, but as we have said before, it is inadequate to protect critical resources and subsistence harvests in that region and we believe it should be expanded. The Borough supports the position that this buffer should be expanded to 60 miles and a deferral area around Hannah Shoal should be added as well. The shallow waters of Hannah Shoal and the sea ice dynamics in this area make it a refuge for ice dependent species such as ice seals throughout the open water season. Exploration and development activities would have a high probability of encountering and impacting ice dependent marine mammal species in this region.

These additional deferral areas would reduce impacts to subsistence hunting activities and the subsistence resources themselves. Barging, operational activities, as well as seismic activity all have the potential to deflect whales away from their typical migratory pathways, and consequently away from hunting areas. Traveling further for subsistence resources increases the danger to hunters and increases the risk that meat may spoil before it is brought back to the community. These activities may also harm marine mammals by keeping them away from feeding or resting opportunities or impinging upon their acoustic habitat.

(National Academy of Sciences, 2014).

Comments from the National Marine Fisheries Service to the Minerals Management Service (MMS, the precursor to BOEM) regarding the 2009 draft environmental impact statement for the Beaufort Sea and Chukchi Sea Planning Areas, noted the benefits of a 60 mile deferral area. Notably, this deferral area would:

- Provide some degree of impact reduction for the endangered bowhead whale, as this population migrates through the nearshore lead system of the sea ice during its spring migration in to the Beaufort Sea. The spring lead system is one of the most sensitive environments for these whales.
- Afford some mitigation and avoidance for the Native villages along the Chukchi coast which depend on the subsistence resources, especially marine mammals.
- Protect nearshore marine resources and reduce the potential for a catastrophic event to impact benthic habitats, migratory current corridors, and nearshore estuarine habitats.[5]

For these reasons, the Borough continues its support for Alternative III, with 60 mile deferral.

Other Mitigation Measures

In addition to deferrals, we would ask that all lessees proposing to conduct operations within arctic planning areas be required to consult with the Alaska Eskimo Whaling Commission (AEWC) and other appropriate marine mammal user groups with the goal that they will sign a Conflict Avoidance Agreement (CAA). CAAs, and the negotiations leading to their adoption, have proven to be highly effective tools not only for avoiding conflicts, but also for an exchange of scientific and local knowledge and a resulting improvement in operations.

We would recommend that operators consult with marine mammal co-management organization to help establish the proper timing for operations. For example, there is an increase in fall whaling in some of our communities. In addition, the annual beluga harvest in Point Lay occurs in late June or the first two weeks of July. The best available science suggests that belugas come from the north and offshore areas before they arrive near Point Lay. The community is concerned that industrial activities in offshore areas before the hunt could deflect belugas or make it harder to hunt them. Point Lay has often requested that operations be delayed until after the hunting of beluga whales, which generally ends around July 15th.

Date Gaps Remain

Decisions related to offshore oil and gas activities must be based on the best available information -- including both western science and traditional and contemporary local knowledge. In many cases, the best available and most current and reliable information is local knowledge. Current and reliable information is necessary to ensure that offshore activities are planned and conducted in a manner that avoids or minimizes to the greatest extent possible any impacts to North Slope residents and the arctic marine environment while also providing as many benefits as possible.

[5] Letter from Robert D. Mecum, Acting Alaska Region Administrator, National Marine Fisheries Service to John Goll Alaska Regional Director, Minerals Management Service at 9 (March 27, 2009).

In addition, baseline environmental information is still needed in the Chukchi Sea. ConocoPhillips, Shell, and Statoil have spent a large amount of time and resources in helping to fill critical data gaps. And the North Slope Borough and Shell are working to fill information needs through a Baseline Studies Program. Even with those efforts, we need to better understand how the Chukchi Sea and the resources we depend on are responding to climate change and human activities. This information is essential if appropriate mitigation measures are to be developed, to identify causes as ecosystem changes continue to occur, and for damage assessment and compensation in the event of an accident.

Address Human Health Impacts

A lack of appropriate health data and health impact assessment has historically complicated efforts to understand how observed illness trends in the NSB are determined by ongoing development activities. Just until recently, impacts to human health from various project proposals and plans were not evaluated, even though, within NEPA, regulations instruct agencies to evaluate the direct, indirect and cumulative health effects of proposed federal actions (40 C.F.R. § 1508.8). Furthermore, it is stated by the CEQ (1997, p.9) that, "Agencies should consider these multiple, or cumulative effects, even if certain effects are not within the control or subject to the discretion of the agency proposing the action."

Health impact assessment is an accepted tool used internationally in evaluating public health impacts from various policies, programs, projects and proposals. The North Slope Borough has implemented health impact assessments into planning documents, specifically, environmental impact statements, to effectively mitigate against negative health impacts from large oil and gas projects and maximize the benefits to communities most affected by the project.[6]

The concern that the North Slope has are the disproportionate share of negative environmental consequences resulting from industrial operations in the outer continental shelf, and the cumulative impacts from various projects from multiple agencies will have on our communities' health. The actions of the federal agencies with regard to OCS development have a profound effect on our communities; with increased OCS exploration, and the potential for OCS development, these impacts will intensify and multiply. To date, most NEPA analysis in the region has focused on identifying "upstream" factors such as pollution and economic change. As BOEM has acknowledged, these factors can exert a profound impact on public health (both positive and adverse). NEPA was enacted in recognition of the fact that the environmental consequences of major federal actions come with interrelated social, economic, and health effects, and the consideration of these effects was central to the purpose of NEPA. NEPA's requirement to analyze and consider mitigation for health effects reflects not only an administrative requirement but an ethical imperative. To protect our communities, BOEM must work with us toward the goal of recognizing and addressing any appropriate mitigation measures available to reduce potential health effects of any proposed action in the outer continental shelf.

[6] NSB and Habitat Health Impact Consulting, Health Indicators in the North Slope Borough: Monitoring the Effects of Resource Development Projects, June 2014.

Risks without Financial Rewards

Oil and gas activities in the Chukchi Sea carry a considerable amount of risk for residents of the North Slope Borough. We continue to have concerns about the process and the remedies available under the Oil Pollution Act of 1990 (OPA-90) for disruption to seasonal subsistence activities. We continue to advocate that operators participate in the Good Neighbor Program outlined in the Information to Leasees, and for BOEM's continued support of this program. We also expect that BOEM continue to ensure Bonds are sufficient to cover any potential damages.

Finally, without the revenue sharing enjoyed by other coastal regions or onshore facilities subject to local government taxation, the North Slope Borough receives little benefit. We strongly encourage the Administration and Congress to work toward an equitable arrangement for the sharing of revenues received from offshore leasing and activities with the local community to help offset potential and realized local impacts from those activities.

Conclusion

In conducting its analysis, it is important for BOEM to listen to the views of the local stakeholders. We have valuable traditional and local knowledge to contribute to ensure the Final Second SEIS is accurate and the analysis of the Alternatives is complete. Finally, public health analyses must be completed for oil and gas projects that have the potential to affect the health of a community.

We want to be sure that the Alternative selected balances development while minimizing impacts to subsistence and preventing an oil spill. For this reason, the Borough continues to advocate for Alternative III, with the 60-mile Deferral Corridor.

Thank you for the opportunity to provide comments on this Draft Second SEIS for Lease Sale 193. It is our hope and expectation that these comments, in addition our comments as a cooperating agency on the earlier drafts, will result in an improved Final Second SEIS. We look forward to continuing to work together.

Sincerely,

Charlotte E. Brower

Charlotte E. Brower
Mayor

Cc: Jacob Adams, Sr., CAO
John Boyle, Special Counsel
Lauren Berdow, Borough Attorney
Dawn Winalski, Assistant Borough Attorney
Rhoda Ahmaogak, Director, Planning Department
Taqulik Hepa, Director, Wildlife Management

Attachments:
NSB Technical Comments Table
NSB Air Quality Comments
NSB Comments from Feb 14, 2014 to ARRT on Dispersants

NSB Technical Comments
BOEM Second Supplemental EIS Lease Sale 193

Document Section or Figure Number	Comment
3.3.4 page 133	First paragraph, "material-child health" should be changed to maternal-child health.
3.3.4 page 134	Under the title "Chronic Health Conditions" – "In the NSB 2014 health indicator study, some conditions appear to have a lower prevalence than in the state as a whole; these conditions include heart disease, hypercholesterolemia, high blood pressure, diabetes and thyroid conditions." In the report *Health Indicators in the North Slope Borough: Monitoring the Effects of Resource Development Projects*, hypercholesterolemia is not reported to have a lower prevalence in the state as a whole, and diabetes is neither reported higher or lower than the state.
3.3.4 page 135	Under the title "Mental Health Disorders" – "Mental health can be further affected by limitations on employment, income, access to services, physical environment, food security and cultural supports (NSB 2014)." The report is misquoted here. In the report, the sentence states, *Mental health can be affected by many determinants related to resource development such as employment and working conditions, income, access to services, physical environments, housing quality, food security, personal health practices and cultural supports.*
3.3.4 page 140	Under the heading "Traditional Culture and Well-Being" – This section has more to do with family stability then it does with traditional culture and well-being. A discussion of culture and language within the context of an EIS is adequately articulated in the NOAA NMFS supplemental draft EIS for effects of oil and gas activities in the Arctic Ocean (3-214) and the indicators shown in the NSB Health Indicators report (2014) show a strong traditional culture (page 28-29).
3.3.4 page 141	Under the heading "Environmental Contaminants" – There is a sentence taken verbatim from the NSB Health Indicators report that is referenced to NewFields, 2012 but should be referenced to the NSB 2014 report. "Exposure can occur through a number of difference routes: through inhalation (via outdoor or indoor air; ingestion (through food or water); or via dermal contact (touching a substance) (NewFields, 2012)." This appears on page 37 of the NSB Health Indicators Report.
4.3.13. Page 366 Page 370	Under the heading "Alternatives I and IV" – second paragraph states, "Incorporation of primary prevention measures into community planning during development can contribute to wider achievement of public health goals and strengthen engagement between those conducting the health care work and local health systems." Mitigation measures and/or lease stipulations for this draft EIS should include protections for public health, similar to those mitigation/lease stipulations in the NPR-A EIS, especially for onshore operations that will have expected influx of outside workers, or exposing community members to pathogens or other communicable diseases from various vessel traffic (pg 370). It is also stated in the EIS that an increase in field crews and oil workers conducting land-based operations have the potential to place strain on infrastructure as workers utilize the health system due to illness or injuries (370). Operators should outline in a health plan how they will manage personnel that become ill or have an injury – will there be onsite medical staff employed by the operator, or will local NSB health clinics be utilized? Health care services for local community members will decrease if operators choose to utilize local health care clinics and put a strain on already limited health care services in NSB communities.

4.3.13 Pg 374	Last paragraph – "Industry workers travelling through the NSB in support of operations were to be given a fitness for work medical review to prevent the spread of communicable diseases in order to help preclude public health impacts." In my review I haven't seen this plan in any mitigation measure or lease stipulation, but strongly encourage operators to implement this plan.
4.3.13 Pg 379	Under title "Health Care Systems" – "If an oil spill affects health, there will be increasing burdens on health care systems." During an oil spill, will operators respond with their own medical personnel, or will local community health clinics and staff be the only medical personnel available during an oil spill?
p. 26	Table 2-3 – Please rearrange chronologically
p. 26	Under Marine Seismic -- Is 5 surveys in 25 years really a realistic estimate? It seems like there would be more. The Alternatives in the Draft Arctic EIS allow for more than 5 in one year, and in 4.1.1.1, more are outlined.
p. 88	Please update the reference to the Bearded Seal as Threatened, pursuant to the District Court decision vacating the rule.
p. 278	Ship strikes now a problem, low probability but may be increasing but it is speculative to say they are a bigger problem than oil spills For an oil spill, baleen fouling likely would have the greatest impact need more analysis on the impacts
	When evaluating effects to subsistence, please add Bowhead Smell Study

AIR QUALITY COMMENTS – December 15, 2014

Chukchi Sea Oil and Gas Lease Sale 193
Second Draft SEIS
OCS EIS/EA
BOEM 2014-653
dated October 2014

The Draft Second Supplemental Environmental Impact Statement (SEIS) – which re-assesses the potential environmental effects of potential oil and gas activities associated with Lease Sale 193 – is based on a new exploration and development scenario of 4.3 billion barrels of oil. The Bureau of Ocean Energy Management's (BOEM) updated oil and gas exploration, development and production scenario for Lease Sale 193 falls short of fully analyzing the potential direct, indirect, and cumulative environmental effects of the oil and gas activities on air quality and human health. The SEIS must include a detailed comprehensive assessment of the environmental and public health impacts of the revised proposed development and production scenario. BOEM cannot make a determination on the impacts of the proposed scenario absent a more comprehensive, documented air quality analysis.

NSB has provided comments on the air quality impact analysis prepared for several post-leasing processes and activities related to Lease Sale 193, including Shell's 2010 Exploration Plan for OCS Lease Sale 193, EPA's PSD permits for Shell's exploration drilling program in the Chukchi Sea and ConocoPhillips PSD permit application for exploration drilling in the Chukchi Sea.[1] These previous comments, as they relate to the air quality impacts from development of areas under Lease Sale 193, should be considered as relevant and supplemental to the following comments specific to this draft second SEIS for Lease Sale 193.

The update to the air quality impact analysis for this draft second SEIS is a radical change from the methods used previously to assess air quality impacts for the post-leasing processes and activities related to Lease Sale 193 and varies greatly from the methods widely used in other NEPA planning actions and EPA permitting actions. In addition to the different analysis methods there are no details presented in this draft second SEIS on the magnitude of the air emissions assessed or the results of BOEM's analysis – i.e., there are no technical support documents describing the revised development and production inventory and assumptions used in the updated analysis. Without more information it's impossible to evaluate BOEM's determination that the Proposed Action would result in negligible impacts for all "routine activities".[2]

[1] NSB Comments to Minerals Management Service November 10, 2009 on Shell Offshore 2010 Chukchi Sea Outer Continental Shelf Exploration Plan and Environmental Impact Assessment; AEWC, ICAS, NSB Comment letters to EPA on Shell Gulf of Mexico/Shell Offshore Inc.'s Application for a Chukchi Sea Clean Air Act Permit, October 20, 2009 and February 17, 2010; NSB, AEWC, ICAS Comments to EPA on the Draft OCS Title V Clean Air Act Permit for ConocoPhillips Exploratory Drilling in the Chukchi Sea, September 21, 2011.

[2] BOEM, Chukchi Sea Oil and Gas Lease Sale 193, Draft Second Supplemental Environmental Impact

The Draft Second SEIS notes new information since the preparation of the 2007 FEIS and 2011 SEIS. Notably, the U.S. Fish and Wildlife Service has designated parts of the North Slope adjacent to the Chukchi Sea as "Sensitive Class II Areas."[3] BOEM should assess impacts at these locations and should consider treating impacts as significant if they exceed the Clean Air Act standards for Class I areas. BLM commonly does this in NEPA actions to ensure adequate protection of these "sensitive" areas. At a minimum, BOEM should consult with the Federal Land Manager to solicit feedback on appropriate significance levels to use when assessing impacts at these locations.

The Draft Second SEIS also acknowledges that there have been revisions to the National Ambient Air Quality Standards (NAAQS) for certain pollutants since the 2007 FEIS and 2011 SEIS were prepared.[4] BOEM should include a discussion of how the EPA's recent proposed revisions to the ozone NAAQS could impact development under Lease Sale 193.

Finally, the Draft Second SEIS discusses the December 2011 amendment to the Clean Air Act, "changing regulatory jurisdiction over air emissions from OCSLA activities from EPA to BOEM."[5] This Draft Second SEIS provides an opportunity for BOEM to provide a solid analysis of potential air quality impacts under Lease Sale 193 that can be used as a basis for future permitting of development activities under OCSLA. NSB would like to see BOEM complete a more comprehensive analysis of air quality impacts for this SEIS, as described in detail below.

BOEM Should Complete a More Comprehensive Assessment of Air Quality Impacts for the Draft Second SEIS

The Draft Second SEIS does not fully and rigorously evaluate and disclose the air quality impacts to coastal and human environments from the proposed lease sale activities. BOEM must include details of the technical data and analyses used to assess the potential direct, indirect, and cumulative environmental effects of the oil and gas activities on air quality and human health.

Under the authority of the Secretary of the Interior, BOEM must ensure that all mineral resource operations on the Outer Continental Shelf (OCS) are conducted according to OCS Lands Act (OCSLA) and other Federal laws (30 CFR 550.101(a)). OCSLA specifies that "[m]anagement of the outer Continental Shelf shall be conducted in a manner which considers economic, social, and environmental values of the renewable and nonrenewable resources contained in the outer Continental Shelf, and the potential impact of oil and gas exploration on other resource values of the outer Continental Shelf and the marine, coastal, and human environments" (43 U.S.C. 1344(a)(1)) where the "human environment" is defined as "the physical, social, and economic components,

Statement, Vol. 1, October 2014, 37 ("Draft Second SEIS").
[3] Draft Second SEIS at 58.
[4] Draft Second SEIS at 60.
[5] Draft Second SEIS at 60.

conditions, and factors which interactively determine the state, condition, and quality of living conditions, employment, and health of those affected, directly or indirectly, by activities occurring on the outer Continental Shelf" (43 U.S.C. 1331(i)). Clearly, BOEM has an obligation to ensure that human health is not adversely impacted by development of the lease blocks in the Chukchi Sea. BOEM must also ensure adequate protection of the human environment in the sense that it must consider factors that impact the "quality of living conditions" in affected areas and therefore must determine whether the cumulative impacts of resource development (including potential impacts from oil spills) in conjunction with all other past, present and foreseeable development in the region has the potential to result in significant deterioration of air quality or adverse impacts on air quality related values in newly designated Class II sensitive areas on the North Slope of Alaska.

Under the National Environmental Policy Act (NEPA), Federal agencies must conduct an environmental review at each phase of the OCSLA process (*i.e.*, for a five-year lease plan on the OCS, for individual lease sales, for exploration, and for development and production). As part of the leasing phase, BOEM must use the NEPA process to "identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment" and must "[u]se all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment." *See* 40 CFR 1500.2(e) and (f).

The 2007 Chukchi Sea Planning Area Oil and Gas Lease Sale 193 Final EIS did not include a full assessment of air quality impacts, as required under NEPA and OCSLA. Instead it reached general conclusions. For example, the EIS concluded the following about the effects of proposed Sale 193 on air quality:

> Effects to air quality from emissions would cause only small, local, and temporary increases in the concentration of criteria pollutants but would not cause ambient air quality standards to be exceeded. Because the Proposed Action would have impacts that are comparable or lower than those predicted for Sale 144, and less than the existing Prudhoe Bay/Kuparuk/Endicott oil- production complex, we conclude that the release of criteria pollutants would remain well within PSD limits and NAAQS. Consequently, we consider the effect on air quality to be low.[6]

With regard to cumulative impacts to air quality, the 2007 final EIS concluded that:

> Potential impacts from future lease sales on the OCS and on land are ***difficult to evaluate***. However, we can expect that any development would be scattered over a rather large area. Modeling performed for the Sale 144 final EIS (USDOI, MMS, 1996a) showed that impacts from widely scattered emissions sources on the OCS are small and well within regulatory standards. The Final 5-Year

[6] USDOI, OCS EIS/EA MMS 2007-026: Sec. IV.C.1.b(1)(b), IV-42.

> Program EIS for 2007-2012 (USDOI, MMS, Herndon, 2007) discusses the cumulative effects of the program in all areas. The relevant major finding was that no major degradation of onshore air quality is predicted. Emissions associated with routine program activities could cause small increases in onshore concentrations of some air pollutants. Emissions ***should*** not cause any exceedance of national or State air quality standards. In the event of a large oil spill, the concentrations of volatile organic carbons (VOC's) would increase rapidly near the spill site, but concentrations would dissipate rapidly and would be much reduced after the first day and would not cause major impacts.[7]

However, no real assessment of the direct, indirect or cumulative impacts to air quality from the proposed lease sale was included in the final EIS to support the general, qualitative statements about air quality that are included in the underlying lease sale and 5-year program assessments. The modeling performed for Lease Sale 144, which appears to be the basis for the assumptions about air quality impacts at the time of the 2007 FEIS, was completed almost 20 years ago and only presents an assessment of compliance with outdated NAAQS and increment standards.[8] The 2011 SEIS stated that, "[n]o new information regarding air quality has been introduced in this Final SEIS."[9]

In order to meet its obligations under NEPA and OCSLA and other Federal laws such as the Clean Air Act, BOEM should use this Second SEIS process to include appropriate air emissions inventories and modeling assessments of the development and production scenario and present the predicted air quality impacts on the affected coastal and human environment. In doing so, BOEM must ensure the public that allowable levels of emissions from the proposed scenario will not cause or contribute to violations of health-based air quality standards, will not cause significant deterioration of air quality and will not have any adverse impacts on air quality related values in newly designated Class II sensitive areas. The SEIS must then establish necessary binding and enforceable lease stipulations that are capable of preventing any such adverse impacts to human health and the environment.

As mentioned earlier, air quality regulation of OCS activities in the Arctic OCS is now the responsibility of BOEM, rather than EPA, and lessees that propose oil and gas activities within the boundaries of the Lease Sale 193 Program Area "must demonstrate compliance with the BOEM Air Quality Regulatory Program (AQRP)" (i.e., 30 CFR Part 550 subpart C).[10,11] Since BOEM has not yet issued permits for OCS activities in the

[7] *Id.* at Sec. V.C.2., V-15 (emphasis added).
[8] See, e.g., p. IV-B-81 of OCS EIS/EA MMS-96-0012, May 1996, *available at* http://www.boem.gov/About-BOEM/BOEM-RegionsAlaska-Region/Environment/Environmental-Analysis/96_0012Vol1.aspx.
[9] OCS EIS/EA BOEMRE 2011-041, August 2011, p. 52, *available at* _http://www.boem.gov/uploaded Files/BOEM/About_BOEM/BOEM_Regions/Alaska_Region/Environment/Environmental_Analysis/2011-041v1.pdf.
[10] As noted in the Draft Second SEIS, the "Consolidated Appropriations Act, 2012" (Act) (December 23, 2011 Pub. L. 112-74) revised Section 328(a) and (b) of the 1990 CAA Amendments (1990 CAAA) giving regulatory jurisdiction to the Secretary of the Interior for the OCS planning areas adjacent to the Alaska North Slope Borough, which includes the Chukchi Sea OCS Planning Areas (Arctic OCS).
[11] Draft Second SEIS at 60.

Arctic OCS the importance of a comprehensive assessment of air quality impacts and establishment of associated lease stipulations at this stage in the process will help ensure that the proposed development and production scenario – as a whole – does not have the potential to pose significant impacts to human health and the environment.

The Draft Second SEIS makes the following conclusion with respect to air quality impacts from the proposed action from year one through year 74:

> Each stage of operation within each phase of the Scenario results in a negligible air quality impact when considering the countervailing effects of actual operations together with dilution and diffusion of the pollutants over time and distance. The emission sources, when characterized as mobile, will not produce emissions sufficient to overwhelm the effects of wind and transport in a single area causing deterioration of air quality over the Alaska North Slope. The overall analysis of air quality demonstrates a negligible impact on the Alaska North Slope, except in the case of a large oil spill, in which case the impact would be moderate because of VOC emissions that would be long lasting and widespread, but less than severe.[12]

Overall, the lack of details presented in the SEIS make it impossible to evaluate BOEM's conclusion, as summarized above and outlined on pages 179 through 190 of the SEIS. BOEM must make the details of the input parameters and assumptions and the results of its impact analysis available for review as part of this SEIS (*e.g.*, emission inventories and assumptions, model inputs and assumptions, tables summarizing predicted pollutant concentrations, receptor locations and background concentrations onshore and at subsistence hunting locations, etc). In addition, BOEM must quantify what it means by the varying degrees of impact severity that are identified in the SEIS – *e.g.*, clearly define what quantifies a negligible impact, a minor impact, a moderate impact, etc, and how these directly relate to significant impacts, as determined under NEPA.

BOEM cannot rely on dilution and diffusion – as repeatedly stated in the SEIS – as a means to address actual predicted impacts that are significant, as defined under NEPA. Rather, BOEM must establish lease stipulations to require controls on exploration, development and production operations that will ensure no significant impacts from the proposed action. The atmospheric conditions that impact pollutant dispersion and the resulting pollutant concentrations are a key part of the dispersion modeling analysis employed to determine air impacts. Therefore, if BOEM is properly assessing the predicted emissions from the proposed action using appropriate, modern modeling techniques then the results will have already accounted for the dilution and diffusion over time and distance that would be expected to occur.[13]

It's unclear, due to the lack of detailed information on the dispersion analysis referenced

[12] Draft Second SEIS at 190.
[13] The Draft Second SEIS mentions dilution and diffusion many times in the context of addressing potential modeled impacts to air quality. *See* pp. 173, 185, 186, 187 and 190 of the SEIS.

throughout the air quality sections of the SEIS, but appears that BOEM is relying solely on the very simplistic Gaussian dispersion equation described on page 180 of the SEIS – rather than a more sophisticated computer modeling analysis – to assess impacts.

The SEIS should include a full-scale computer modeling analysis of the direct, indirect and cumulative impacts on air quality that could occur under the various alternatives of the development and production scenario. A comprehensive emission inventory of all air pollution sources and all assumptions made should be presented as part of the SEIS and the input parameters, assumptions and results of the associated air quality dispersion modeling analyses used to assess the impacts on air quality should be presented. In order to comply with 40 CFR §1502.24 (to ensure the professional and scientific integrity of the air quality analysis), the air quality analysis should include the following components:

> The inputs for the analysis should include an emissions inventory of all of the air pollution source categories allowed under the alternatives of the SEIS. The cumulative impact analysis should include all existing sources and reasonably foreseeable sources of air emissions that could impact the same area impacted by the development and production scenario under Lease Sale 193.
>
> The maximum emission rates from sources *over the averaging times of the standard for which compliance is being assessed* should be modeled. It appears from the SEIS that only annual average emission rates were calculated and considered in BOEM's analysis.[14] This could grossly underestimate short-term impacts, especially when considering 1-hour average and 24-hour health-based standards (NAAQS).
>
> The modeling analysis should employ the latest, EPA-recommended models and be based on representative meteorological data – *e.g.*, for a near-field assessment: at least one year of quality-assured, on-site, representative meteorological data or, if no on-site data are available, five years of meteorological data from the closest meteorological station representative of the area; and for a far-field assessment: three years of mesoscale meteorological data. *See* EPA's Guidelines on Air Quality Models at 40 CFR Part 51, Appendix W.
>
> In order to properly assess the significance of the modeled impacts in comparison to the NAAQS, appropriate background concentrations reflective of current air quality in the area should be added to the modeling results. *See* EPA guidance for the 1-hour NO_2 and 24-hour $PM_{2.5}$ National Ambient Air Quality Standards.[15]

[14] *See* Draft Second SEIS at 179. "This analysis takes into account the context and intensity of the impacts defined under Section 4.2 *Impacts Scale* by: … Quantifying the *annual* rate of projected emissions from those sources …" [emphasis added]
[15] *See* March 1, 2011 EPA Memo Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, p. 17 and February 26, 2010 MEMO from Tyler Fox, EPA Air Quality Modeling Group to Erik Snyder, Lead Regional Modeler EPA Region 6, Regarding "Model Clearinghouse Review of Modeling Procedures for Demonstrating Compliance with

> Air quality impacts should be assessed at locations of maximum concentration and at other sensitive locations. This would include all areas of subsistence hunting, all populated onshore areas and sensitive Class II areas.

These impact analyses should be performed for the SEIS to provide the public with information on the air quality impacts of the various alternatives proposed and so that government officials would be aware of any conflicts that could occur with the objectives of Federal, State, and local laws regarding protection of air quality. Such analyses must also be performed so that appropriate mitigations can be developed and put into place as lease stipulations to protect air quality in the affected area. BOEM must conduct this level of impact analysis for the various alternatives in the SEIS in order to fulfill its obligations under NEPA.

The reliance on significance levels, as established by EPA under its permit requirements (*see* 40 CFR 51.165(b)(2)), to classify impacts from the proposed action as de minimis should not be used to avoid taking a hard look at cumulative impacts from the proposed action, as required under NEPA. EPA has urged caution about the use of significant impact levels where a number of de minimis impacts could collectively create air quality problems.[16] According to EPA, "notwithstanding the existence of a [significant impact level], permitting authorities should determine when it may be appropriate to conclude that even a de minimis impact will ''cause or contribute'' to an air quality problem and to seek remedial action from the proposed new source or modification."[17] Further, EPA has stated that "we have historically cautioned states that the use of a [significant impact level] may not be appropriate when a substantial portion of any NAAQS or increment is known to be consumed".[18] BOEM must assess whether the impacts from the proposed development and production scenario are considered significant, as defined by NEPA. Even if an individual screening assessment of worst case exploration, development and production scenarios results in predicted concentrations below EPA significance levels, that does not necessarily ensure that the direct, indirect and cumulative impacts would be considered insignificant under NEPA. Again, details of the impact analyses are needed in order to be able to evaluate BOEM's determination of de minimis impacts.

The Draft Second SEIS includes a qualitative discussion of ozone and, specifically, of VOC emissions' influence on ozone levels. The SEIS proposes the use of VOC-to-NO_x emissions ratios to determine the potential for ozone formation. Specifically, the SEIS concludes that:

> [W]hen a proposed action emits much less VOC emissions than NOx emissions,

$PM_{2.5}$ NAAQS", p. 2.
[16] *See* USCA Case #10-1413, Document # 1380762, Filed 6/26/2012, p. 18, http://www.epa.gov/ogc/briefs/10-1413.pdf , According to this brief, EPA does not intend that significant impact levels "be used as a means of allowing known adverse air quality situations to be ignored just because they are small."
[17] 75 FR 64892, October 20, 2010.
[18] 75 FR 64894, October 20, 2010.

> where the VOC to NOx ratio is less than 4-to-1, such conditions would not be favorable for the formation of ozone. Such is the situation with respect to total projected emissions from activities associated with the Scenario (NESCAUM, 1994).[19]

The 1994 NESCAUM (Northeast States for Coordinated Air Use Management) reference that is the basis for BOEM's assertion that conditions associated with the development and production scenario would not be favorable for the formation of ozone is titled "Limitations of the VOC to NO_x ratio approach" and, in fact, "caution[s] that there are a number of limitations to, and potential biases in, the use of VOC to NO_x ratios."[20] According to this NESCAUM source, "[i]t will ultimately be critical to distinguish between ozone contributions from local precursor emissions, from transported ozone formed in upwind locations, and from in-situ ozone production from transported upwind precursors."[21] This NESCAUM source notes that, "[t]here are also questions about which species should be included in a calculation of "total VOCs" and "total NO_x,"" and identifies "a remarkable inconsistency in the literature among different calculations of total VOC at different sites and time periods."[22] Finally, this NESCAUM source points out that, "the simple ratio of the two disregards the composition and reactivity of individual hydrocarbon and nitrogen compounds."[23]

The Draft Second SEIS goes on to say that, "where an oil spill is projected to release enough VOCs to cause the ratio of VOC to NO_x emissions to be greater than 4 to 1 and less than 15 to 1, then the formation of ozone should be expected."[24]

BOEM should not rely solely on the use of VOC-to-NO_x ratios to make a determination of the likelihood of ozone formation from the proposed action and any potential oil spill. In addition to the concerns identified above in the NESCAUM report, EPA has described several limitations with this method, including: (1) the wide variability of the ratios across time and space; (2) the influence of vertical mixing processes in ozone formation; and (3) "the prevailing atmospheric chemistry (e.g., composition and age of air mass)".[25] EPA concludes that

> By themselves, VOC/NO_x ratios probably cannot be used unambiguously to infer NO_x or VOC control strategy effectiveness. However, in combination with other observational (and gridded models) techniques, the VOC/NO_x method adds corroborative value.[26]

[19] Draft Second SEIS at 178.
[20] NESCAUM Report, Preview of 1994 Ozone Precursor Concentrations in the Northeastern U.S., *available at* http://capitawustl.edu/nescaum/Reports/PAMS94/nepams4.html#Limitations_of_the_VOC_to_NOx_ratio_appr
[21] *Id.*
[22] *Id.*
[23] *Id.*
[24] Draft Second SEIS at 178
[25] EPA-454/R-96-006, Observational Based Methods for Determining VOC/NOx Effectiveness, Chapter 4, p. 3, November 1996, *available at* http://www.epa.gov/ttnamti1/files/ambient/pams/chap4.pdf.
[26] *Id.*

According to the Draft Second SEIS, "[r]ecent research by Song, Shon, Kim et al. (2011) suggests that because an offshore oil spill releases so much VOCs into the atmosphere, "oil spill accidents are thus expected to affect significantly" the air quality near the spilled and adjacent areas."[27] Given the potential for significant impacts from a spill, BOEM should employ a gridded model analysis to better determine the potential scale and location of possible impacts and to aid in determining potential mitigation measures targeted at reducing impacts to populated areas. Use of a dispersion modeling analysis will be the best way for BOEM to determine potential ways to minimize impacts in the most crucial areas of impact in the event of a spill.

BOEM Should Include Adequate Plans to Prevent Significant Impacts to Air Quality in the Affected Area for the Draft Second SEIS

BOEM should ensure appropriate mitigation measures are developed and put into place as lease stipulations to prevent any potential significant air quality impacts in the affected area, based on the air quality modeling analyses used to determine impacts for the SEIS.

It does not appear that the Draft Second SEIS includes any additional mitigation measures. Specifically, the SEIS states

> Activities under each Alternative would be subject to a variety of mitigation measures. More detailed discussion of applicable mitigation measures is available in Section II.B of the 2007 FEIS. BOEM did not identify any additional mitigation measures specific to the natural gas development and production scenario evaluated in the 2011 SEIS, or the Lease Sale 193 Exploration and Development Scenario (Section 2.3) in this Lease Sale 193 Draft Second SEIS. Most pertinent to the analysis of mitigation measures are the binding and enforceable measures known as lease stipulations, described below. … No additional lease stipulations have been considered during this Lease Sale 193 Draft Second SEIS.[28]

BOEM must complete and disclose a more comprehensive air quality impact analysis and must implement lease stipulations, as needed, to ensure the proposed development and production scenario will not result in significant impacts to human health or the environment.

[27] Draft Second SEIS at 178.
[28] Draft Second SEIS at 15.

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0116
Comment from Alex Whiting, Native Village of Kotzebue

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Government Agency Type: Tribal

General Comment

See attached file(s)

Attachments

NVKotzebue comments Chukchi Sea Lease 193 draft SSEIS December 2014

NVKotzebue Council 13-165 Supporting Compreh. Arctic Waters Planning

NVKotzebue Council Resolution lease sale 193

NVKotzebue Harvest Survey Report 2002-2004

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December 16, 2014

Dr. James Kendall
Regional Director
Alaska OCS Region, BOEM
3801 Centerpoint Drive, Suite 500
Anchorage, AK 99503-5820

RE: Chukchi Sea Planning Area Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska Draft Second Supplemental Environmental Impact Statement

Dear Dr. Kendall,

The Native Village of Kotzebue appreciates the opportunity to comment on the recent release of the Draft Second SEIS for the Chukchi Sea Oil and Gas Lease Sale 193 to address the issues specified by the U.S. Court of Appeals for the Ninth Circuit in regards to insufficiencies with the original Lease Sale 193 EIS. We appreciate that the Court recognized the deficiencies with the original EIS and the first supplemental EIS and requested that BOEM improve the document.

The citizens of the Tribe strongly rely on the healthy populations of fish and wildlife that use the Chukchi Sea for feeding, reproduction, and overall survival. The Tribe believes that the high quality of the current environment and ecosystem of the Chukchi Sea provides for robust and healthy populations of marine wildlife and negative impacts on this habitat through poorly planned or executed development would pose an inordinate risk to these populations and subsequently to our tribal citizens that continue to derive their cultural meaning, spirituality, and way of life, from their direct dependence on these resources and the quality habitat in which they occur. The Tribe has carried out a harvest survey during 2002-2004 with its citizens, which demonstrated up to 70% of their resources are obtained from the marine environment surrounding the community of Kotzebue. This dependence on the marine environment of Kotzebue Sound and the Chukchi Sea

means there is great risk to the tribal community from any harm that befalls this environment.

The Tribal Council also passed Resolution 13-165 (attached) which called for a comprehensive Arctic waters planning and development approach, that was not being instituted during the Lease 193 sale, or in subsequent actions related to the sale. However, it is recognized that this approach is now closer to being met through the **Arctic Research Plan and the Implementation Plan for the National Strategy for the Arctic Region**, the implementation of the **Secretary of the Interior findings of a Departmental Review detailing Shell's Offshore Oil and Gas Exploration Program in 2012** and the **National Research Council of the National Academies Report: Responding to Oil Spills in the U.S. Arctic Marine Environment and the Upcoming Regulatory Reform for the Arctic**. While it is obvious that both the unfortunate Deepwater Horizon event and the less than stellar performance by Shell Oil's OCS activities in 2012 and the subsequent delays, are the reason that federal government has had both the time, opportunity, and wherewithal to approach the Chukchi Sea OCS in a more comprehensive manner, it is still appreciated that a more holistic and comprehensive approach is being taken moving forward on assessing the impacts related to the Lease 193 sale and the associated activities.

The SEIS could be improved with visual maps that show the migratory patterns and routes of marine mammals, fish and birds with the OCS development areas.

The Tribe would like to request a community workshop to be held in Kotzebue regarding OCS development, spill response which includes community-tribal readiness, and input from residents and tribal citizens on the SEIS, particularly subsistence resources.

The Tribe also requests that the SEIS recommend the establishment of a subsistence trust fund that would be jointly administered with tribes from the Northwest Arctic, North Slope and Bering Strait regions.

In specifics related to the draft second supplemental EIS, a few of our comments below:

Pg. 57 and 58 – "*Ocean acidification in the marine environment is occurring as carbon dioxide (CO2) increases in the atmosphere and the ocean absorbs more CO2 (Arctic Monitoring and Assessment Programme (AMAP, 2013).*" There is no discussion of why there is increasing CO2 in the atmosphere in this section.

While we appreciate the discussion and information provided in the 3.1.9 – 3.1.9.2, including the statement "*While the science is evolving, scientists generally agree the warming trend is accelerating at an unusually rapid rate and is caused by increased emissions of GHG produced by human activities.*" We do find it curious that human activity is specifically implicated in climate change and black carbon, but not in the most easily proven direct correlation field of ocean acidification, where the science is not "evolving" or in dispute. Ocean acidification is directly caused by the release of CO2 from fossil fuels that were made available through past actions exactly like the present action being vetted for permitting – that is the leasing of oil and gas reservoirs to be un-sequestered and made available for eventual release into the atmosphere increasing the amount of CO2 in the atmosphere and the future rate of ocean acidification. Similar comments have been made by the Tribe in the past and we believe these types of documents should at least explicitly acknowledge this reality.

Pg. 88 – "*On December 28, 2012, NMFS listed the Beringia bearded seal DPS as threatened under the ESA (77FR 76740).*" The decision listing Beringia DPS of bearded seals as threatened was vacated – MEMORANDUM DECISION Alaska Oil and Gas Association v. Frank Pritzker, et al, 4:13-cv-00018-RRB – 32 "Therefore, Plaintiffs' Motions for Summary Judgment at Dockets 50, 54, and 55 are hereby GRANTED. The final rule shall be VACATED to the extent it affects the Beringia bearded seal DPS and REMANDED to NMFS to correct the aforementioned substantive and procedural deficiencies. The Clerk of the Court is directed to enter final judgment accordingly. IT IS SO ORDERED this 25th day of July, 2014. S/ RALPH R. BEISTLINE UNITED STATES DISTRICT JUDGE." This change should be noted in this section.

Pg. 104 – "*Subsistence activities are an integral part of the residents' way of life, and each summer they set up the North Tent City fish camp, where the season's catch is dried and smoked.*" This section should statement should be changed to include a broader statement in reference to Kotzebue such as: Subsistence activities are an integral part of the residents' way of life, and each summer residents harvest and process fish and marine mammals at camps near the community and along the shores of Kotzebue Sound and Hotham Inlet.

Pg. 121 – "*Bowhead whales are harvested by the communities of the NWAB.*" Not sure what reference is used for this statement, but besides the community of Kivalina, the other NWAB communities do not harvest bowhead whales – primarily due to shallow waters. However, bowhead whale harvests are shared

with communities in the NWAB as part of subsistence networks, and some residents participate in whaling crews with communities in Kivalina, Point Hope and Barrow to name a few.

Pg. 121 – "*In the spring, Kivalina and Kiana take occasional bowheads if they follow nearshore leads, but more frequently hunt belugas, as do Noatak, Buckland, Deering, and Wales (ADF&G, 2014c).*" See above – Kotzebue needs to be included in communities that frequently hunt beluga.

Pg. 121 – "*Beluga whales also migrate past NAWB communities spending winter in the Bering Sea. In the spring, belugas migrate to coastal estuaries, bays, and rivers. The eastern Chukchi Sea stock gather in the nearshore waters of Kotzebue Sound and Kasegaluk Lagoon, near Point Lay, and Omalik Lagoon in June and July. Between July and September, females tend to remain near the Beaufort and Chukchi Seas shelf break, while the males head for deeper water. In September and October, they migrate west, returning to the Bering Sea providing additional opportunities for NWAB whalers.*" The stocks using Kotzebue Sound are genetically different from the eastern Chukchi Stock, this statement should be vetted with Kathy Frost ABWC secretary or Lori Quakenbush ADF&G Arctic Marine Mammal Division to more accurately reflect what is known today also see: Citta et al. "Dive Behavior of Eastern Chukchi Beluga Whales (Delphinapterus leucas), 1998 – 2008," ARCTIC VOL. 66, NO. 4 (DECEMBER 2013) P. 389 – 406 and Hauser et al. "Population-specific home ranges and migration timing of Pacific Arctic beluga whales (Delphinapterus leucas)," Polar Biol (2014) 37:1171–1183 DOI 10.1007/s00300-014-1510-1

Pg. 121 – Spotted, bearded, ringed and ribbon seals are harvested in the communities of the NWAB. These communities are Kivalina, Noatak, Deering and Buckland. The survey for this was from Maniilaq and they did not survey Kotzebue – this section needs to add Kotzebue (at a minimum) – we have attached the results of our 2002-2004 Harvest Survey, which is the most recent of this topic.

Pg. 121 and 122 – Need to add Kotzebue to the terrestrial harvest discussion – we have attached our 2002-2004 Harvest Survey, also see Godduhn et al. "Subsistence Wildlife Harvests in Kotzebue, Alaska, 2012-2013," ADF&G Special Publication No. SP2014-03 and Liliana Naves "Harvest Survey Project: Kotzebue 2012," Alaska Migratory Bird Co-Management Council Subsistence Harvest Assessment Program

Pg. 142 – 3.3.5. – Environmental Justice section should more explicitly state that all the communities of the NSB, NWAB are classified as EJ Communities on the

basis of their proportional American Indian and Alaska Native membership 4.3.14 EJ section is more explicit in this regards as 3.3.5 should be

Pg. 191 – 4.3.3 – "*The exploration, development and production activities under the Scenario would produce GHG emissions, including carbon dioxide, methane and other gases.* ***These GHG emissions would contribute to climate change.***" Great statement should be reconciled with the discussion on 3.1.9 – also we believe that the amount of potential recoverable oil and gas should be acknowledged as at least becoming available to be released and contribute to climate change as it would become un-sequestered due to the production activity associated with the Lease Sale 193.

Pg. 193 – "*These changes have been attributed to rising CO2 levels in the atmosphere and corresponding increases in the CO2 levels of the waters of the world's oceans, leading to the phenomena of ocean acidification (IPCC, 2007b; Royal Society, 2005). This phenomenon is often called a sister problem to climate change, because they are both attributed to anthropogenic activities that are leading to increased CO2 levels in the atmosphere. The capacity of the Arctic Ocean to uptake CO2 is expected to increase in response to climate change (Bates and Mathis, 2009; Fabry, et. al., 2009).*" Great statement, this should also be reconciled with the discussion in 3.1.9 as we point out above.

We do appreciate the more thorough discussion on noise impacts to fish in section 4.3.5

In reference to impacts of noise on marine mammals we would suggest reviewing: Nowacek et al. "Responsible Practices for Minimizing and Monitoring Environmental Impacts of Marine Seismic Surveys with an Emphasis on Marine Mammals," Aquatic Mammals 2013, 39(4), 356-377, DOI 10.1578/AM.39.4.2013.356.

Pg. 266 – One of our great concerns is the number of undetected pipeline spills that occur and increase over time due to negligence on the part of companies to properly inspect and maintain pipelines, especially in the out years when these problems are most likely to occur, for example: "*as a result of a leak in a corroded pipeline that went undetected for an extended length of time (USFWS, 2006).*" As demonstrated by this spill, small, chronic leaks in underwater pipelines could result in large volumes of oil being released underwater without detection. As stated BOEM regulations require spill-prevention and equipment monitoring and we would expect utmost vigilance on oversight to make sure robust inspection and

maintenance regimes were put in place with strong continuing oversight until the project ends.

Pg. 344 – "*Spill cleanup strategies could reduce the amount of spilled oil in the environment. In the case of a winter spill, when few important subsistence resources would be present and* ***cleanup is likely to be fairly effective****, this is a mitigation measure the can decrease contamination."* Not sure about winter cleanup being characterized as likely to be fairly effective? This assertion also seems to be somewhat at odds with the closing sentence in this paragraph: "*Deflection of resources, resulting from the combination of a large oil spill and spill response activities, would persist beyond the timeframe on a single season, perhaps lasting several years."*

4.3.12.1 – *"For this discussion and analysis, communities closest to the Leased Area - Barrow, Wainwright, Point Lay, Point Hope, and Atqasuk onshore – are the primary focus. However, all regions and communities, including those listed above in the North Slope Borough with the addition of Nuiqsut and Kaktovik, the Northwest Arctic Borough (NWAB), Bering Strait region, and the Russian Chukotka region, will be included in the analysis since they share the same subsistence-harvest patterns* ***and resources*** *as communities who may face a higher potential of direct impacts, which would affect their sociocultural systems."* Add "and resources" to this paragraph.

Pg. 453 – *Table 4-55. Anadromous Waters in Northwest Alaska from Bering Strait to Nuiqsut* - It is not clear why Dolly Varden are not included in the Wulik River, it is well known as important Dolly Varden water. Even if they are not listed in the State's list they should be added.

Pg. 520 – *"Wolves and red foxes should not be affected in* ***any way*** *by a VLOS due to their habitat restrictions;"* Both species frequent the beaches during freeze-up for travel and especially, in the case of red foxes, to forage on marine mammal carcasses and washed up schools of fish, especially arctic cods. While the overall population impacts are likely as stated in the conclusion on page 521, the definitive statement above should be modified to recognize minor impacts.

Pg. 529 – *"They have little confidence in industry's current capability to successfully clean them up,"* True statement because there is no such thing as a "cleanup", the percentage of oil "cleaned up" is always very low to be almost insignificant compared to the natural weathering and disbursement into the shorelines, substrate, waters, and biotic community, which accounts for the vast majority of "cleanup." Our position on cleanup activity is more closely reflected

by the statement on pg. 535, *"Overall, oil spill cleanup activities, are not considered and do not provide mitigation. These activities should be viewed as an additional impact, potentially causing displacement of subsistence resources and subsistence hunters (Impact Assessment, Inc., 1998)."*

Pg. 415 – While the discussion surrounding the frequency of very large oil spills from a loss of well control event is informative in the lead up to the VLOS discussion, there seems to be missing more discussion about the probability of a VLOS from any cause that was discussed in the earlier NEPA documents related to the Lease 193 sale.

Pg. 566 – While the Lease Sale itself may not constitute an *"irreversible and irretrievable commitment of resources,"* it does set in motion a process that leads to "irreversible and irretrievable commitment of resources," especially given the federal government's reluctance to buy back leases, or deny oil companies the ability to realize their substantial investments in the lease areas by allowing at minimum exploration activities – the whole reason for the lease sale in the first place.

Pg. 599 – *"Ocean acidification will continue as a result of climate change* ***and continued increasing levels of anthropogenic CO2 in the atmosphere.****"* Need to add the underlined text as climate change itself only contributes in part (through changes like more open water allowing for more uptake of CO2) to why there is increasing ocean acidification, it is mostly due to increased and increasing anthropogenic CO2 in the atmosphere.

Pg. 606 – *"Sea ice losses during the summer in the Arctic Ocean are expected to have detrimental effects on bearded seals."*
Pg. 607 – *"Climate change effects to the Chukchi and Beaufort Seas will most likely have a positive effect on bearded seals;"*

Need to reconcile these two statements - in addition to reconciling the last statement with the conclusions drawn by NMFS in consideration of the ESA eligibility for the Bearded Seal Beringia DPS, which most definitely did not draw a positive effect conclusion.

Pg. 652 – "*Kotzebue IRA"* – you can change this to "Native Village of Kotzebue," which is the preferred name usage of the Tribe in Kotzebue and almost exclusively used anymore in the Tribes formal communications.

Some general thoughts on the overall document are:

While sobering, we appreciate the detailed social impacts and Environmental Justice discussion included in this document. Although, we have to say, it is unfortunate that there are real world examples on which to draw from, both the communities impacted by the EVOS and the Selendang Ayu spill, one of the reasons why we are less than excited about the prospect of moving forward with the Lease Sale 193 (which was opposed through Council Resolution 07-56 during the 2007-2012 MMS OCS Leasing Program public comment process – see attached) and the possibility, no matter what the probability, of the Arctic communities adding to this record of impacted communities from a VLOS.

Additionally, the detailed and numerous climate change discussions throughout the document are also appreciated and it is encouraging to see this topic become a regular part of federal decision making and determining impacts of federal activities – now if only the Congress could take action to lessen the reality of these impacts in the near and far future.

Having a long term perspective (up to 77 years out) as one of the contexts for the discussion is also useful and appreciated and quite a change from the more familiar impact analysis of looking at 5-10 year time frames.

The Council would request addition of a visual model of the VLOS scenarios showing the plume spread over time at selected intervals (e.g. 1 day, 5 days, 20 days, 40 days) with at least some estimated accompanying resource impacts for selected species (e.g. bowhead, seals, walrus, seabirds) based on quantities and spread of oil predicted. The underlying data to create this type of visual modeling is already present in the document and it would be the preferred way to present it for the public in the rural communities.

Thank you for the opportunity to comment and for the consideration of our comments.

Alex Whiting
Environmental Specialist

Ukallaysaaq Tom Okleasik
Executive Director

Native Village of Kotzebue
Kotzebue IRA

RESOLUTION 13-165

A RESOLUTION SUPPORTING COMPRENHENSIVE ARCTIC WATERS PLANNING AND DEVELOPMENT

Knowledge of Language
Knowledge of Family Tree
Sharing
Humility
Respect for Others
Love for Children
Cooperation
Hard Work
Respect for Elders
Respect for Nature
Avoid Conflict
Family Roles
Humor
Spirituality
Domestic Skills
Hunter Success
Responsibility to Tribe

WHEREAS, the Native Village of Kotzebue is a federally-recognized tribe and is the governing body of the tribal members of Qikiqtaġruk or Kotzebue, Alaska; and

WHEREAS, the Tribe ascribes to self-determination so as to render all services to be more responsive to needs and desires of the Native Village of Kotzebue; and

WHEREAS, the Tribe seeks to support a healthy community environment and lifestyles of our tribal members which promote wellness and our traditional way of life; and

WHEREAS, our Tribal membership and all Alaska's indigenous peoples are inextricably linked to the land, sea and natural world which provides for food security, community well-being, and cultural identity; and

WHEREAS, the Arctic Ocean and the Chukchi, Beaufort and Bering Seas have sustained our tribal membership for thousands of years; and

WHEREAS, these Arctic waters have been recognized through science and traditional knowledge as one of the most biologically important and ecologically sensitive places on Earth; and

WHEREAS, Arctic waters are home to a variety of marine life including whales, seals, walrus, fish, and other resident and migratory animals that ensures the food security for our Tribe and many other Alaskan Tribes; and

WHEREAS, our Tribe and other tribes along the Arctic coast continue to share and trade traditional foods from Arctic waters with other indigenous communities; and

WHEREAS, food security is a basic human right recognized by the United Nations and affirmed by the United States in the International Covenant of Civil and Political Rights; and

WHEREAS, climate change is causing loss of sea ice, severe coastal erosion, extreme weather, ocean acidification, and changes to the migratory animals we depend on for our food security; and

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WHEREAS, climate change is having a negative impact on the ecology of the arctic marine waters and on our ability to hunt, gather and provide for our families; and

WHEREAS, increasing international commercial vessel traffic and offshore industrial development in Arctic waters is raising the risks to marine life and coastal communities; and

WHEREAS, the United States government and other Arctic Nations are moving forward with plans to further develop Arctic waters; and

WHEREAS, Alaska's indigenous Tribes must stand together to support a vision for the Arctic that protects their way of life and puts our people first; and

WHEREAS, Inupiaq Tribes must be at the forefront of planning for the future of our homelands among the Arctic ecosystem; and

WHEREAS, the traditional knowledge and wisdom of our tribal Elders, passed down through generations, is invaluable for understanding the Arctic ecosystem and using best management practices.

NOW THEREFORE BE IT RESOLVED that the Native Village of Kotzebue Tribal Council supports the development by the U.S. Federal Government of a comprehensive Arctic waters management plan for all industrial activities therein that integrates tribal and community input and involvement, requires long-term monitoring, accounts for cumulative effects, includes designated ecological and cultural exclusion areas from development, zero discharge mandate and implements scientifically proven mitigation measures for these industrial activities that will impact our food security, way of life, and the health of our peoples, and

BE IT FURTHER RESOLVED that the United States should not issue any new oil and gas leases in Arctic waters until such a comprehensive and integrated Arctic management plan is formulated and put into place, with assurances that the exploration and development will not jeopardize the safety of nearby villages, tribal health and food security, and the animals that Tribes depend upon.

CERTIFICATION

A vote of 7 for and 0 against and 1 not voting adopt this resolution 13-165 at a regular meeting of the Native Village of Kotzebue, Kotzebue Council held this 17th day of December, 2013.

Chester L. Ballot, Chairman Wilbur Karmun Jr. Secretary

2

Native Village of Kotzebue
Kotzebue IRA

RESOLUTION 07-56

A RESOLUTION SUPPORTING THE ALTERNATIVE II NO-LEASE SALE FOR THE CHUKCHI SEA PLANNING AREA OF THE MINERALS MANAGEMENT SERVICE 2007-2012 OUTER CONTINENTAL SHELF LEASING PROGRAM AND SPECIFICALLY OIL AND GAS LEASE SALE 193 AND SEISMIC SURVEYING ACTIVITIES IN THE CHUKCHI SEA

Knowledge of Language
Knowledge of Family Tree
Sharing
Humility
Respect for Others
Love for Children
Cooperation
Hard Work
Respect for Elders
Respect for Nature
Avoid Conflict
Family Roles
Humor
Spirituality
Domestic Skills
Hunter Success
Responsibility to Tribe

WHEREAS: the Native Village of Kotzebue is an Alaskan Native Village organized as an Indian Tribe pursuant to the provisions of the Federal Indian Reorganization Act of 1934, as amended in 1936; and

WHEREAS: the Kotzebue IRA Council is the governing body of the Native Village of Kotzebue; and

WHEREAS: the Kotzebue IRA ascribes to self-determination so as to render all services to be more responsive to the needs and desires of the Native Village of Kotzebue tribe; and

WHEREAS: the Chukchi Sea has always provided for the needs of the Qikiqtagrugmiut and all people of Northwest Alaska; and

WHEREAS: there is currently a Minerals Management Service project to provide substantial leasing opportunity to oil and gas companies, that combined with increased positive potential field assessments, is leading to increased exploration and potential near-future development; and

WHEREAS: the process and timeline to provide leasing and exploration opportunity for industry in the Chukchi Sea is being driven by industry economics and the Executive mandate for development and not by demonstration of information requirements and technical abilities for minimum limits of completeness, competency, cumulative impacts, environmental justice and mitigation standards set under the NEPA process or measured by northwest Alaska community satisfaction; and

NOW THEREFORE BE IT RESOLVED: that the Native Village of Kotzebue through the Kotzebue IRA Council supports Alternative II No-Lease Sale for Lease Sale 193 and the entire Chukchi Sea planning area of the Minerals Management Service 2007-2012 Outer Continental Shelf Leasing Program

CERTIFICATION

Resolution 07-56 is approved by poll vote of the Kotzebue IRA Council on the 29 day of June, 2007 by a vote of 6 for, 1 against, and 1 not voting.

Guy Adams, Chairman Wilbur C. Karmun Jr., Secretary

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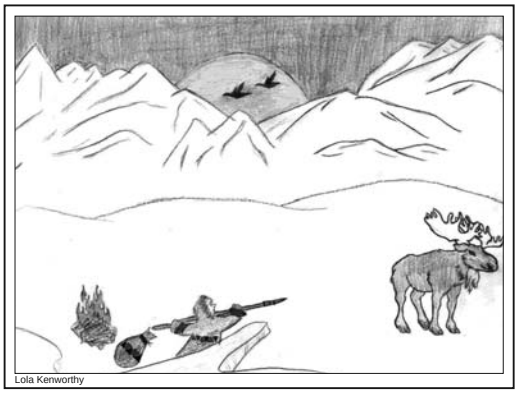
Native Village of Kotzebue

HARVEST SURVEY PROGRAM
2002 – 2003 – 2004



Lola Kenworthy

Results of Three Consecutive Years
Cooperating with *Qikiqtagrugmiut*
to Understand their Annual Catch
of Selected Fish and Wildlife

Alex Whiting - Environmental Specialist
March 2006

Acknowledgements

First and foremost, the Tribe would like to acknowledge the 227 households that participated. Their contribution will benefit all members, and without their cooperation there would be no project. The Nakaitchuat School, June Nelson Elementary School, and the Kotzebue Middle/High School (in particular Lynn Bates' art class) are also recognized for their willingness to have students draw pictures for inclusion in the project calendars. The students (upwards of 50 a year) that submitted drawings are especially appreciated. It was encouraging to see the talent and commitment to the traditional way of life expressed in their drawings. Jim Magdanz also is appreciated for many hours spent assisting the Tribe with this effort.

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Introduction

In 2001 the Native Village of Kotzebue began a harvest survey program with an emphasis on using protocols, methodologies and instruments that would be repeatable. Being able to carry out similar efforts in the future using the same program will allow for the direct comparison of catch rates over time. The Tribe has an interest in knowing how much fish and wildlife its members catch, as these amounts are an integral part of many management processes that affect Tribal members.

Examples of the way catch data are used:

- The Federal Subsistence Board reviews historical catch data when it makes customary and traditional determinations, a prerequisite to subsistence management.
- The Alaska Board of Fisheries and the Alaska Board of Game use catch data to establish amounts necessary for subsistence (ANS), a minimum allocation to subsistence uses. Dall sheep ANS determinations in the Baird and DeLong Mountains were based on traditional take documented by the Alaska Department of Fish and Game (ADF&G).
- All three of the boards use catch data to assess whether subsistence needs are being met from year to year.
- The Ice Seal Committee and its Cooperators, continue efforts to understand harvest levels in the State as part of wider undertaking to establish baseline data of population levels and factors influencing these levels.
- Federal managers soon may establish “subsistence use amounts” (SUA), similar to the state’s “amounts necessary for subsistence.”

Catch information collection by the Tribe should allow for more effective advocacy for its members’ subsistence needs, while at the same time providing for a high level of control of the process. Documentation of current catch levels will also provide a snapshot of early twenty-first century harvests for historic purposes.

Personnel

Alex Whiting developed the program in cooperation with Pete Schaeffer and August Nelson Jr. in 2001 and has overseen the program since then. In 2005, the Tribe contracted with James Magdanz to conduct an independent analysis of the dataset.

Technicians August “Augie” Nelson Jr. conducted the 2002 survey, Patrick Savok conducted the 2003 survey, and Mike Tabor conducted the 2004 survey. Augie’s familiarity with most Tribal members and his ability to easily interact with them, especially in the area of hunting and fishing, played no small part in the success of the initial collection and provided momentum for the project for the remaining two years.

The Project

To begin the process, a list of all Native Village of Kotzebue member households in Kotzebue and the surrounding region was made. The list included 480 households in 2002, and 471 households in 2003 and 2004. Households were assigned ID numbers to provide for confidentiality, creation of datasets and to ease the collection process.

Because not all member households hunt and fish similarly, all households were surveyed using a category determination survey (Appendix 1) in 2001 and organized into high, medium, or low harvesting categories. Catches within each household grouping were expected to vary less than catches in the population as a whole, providing greater confidence in expanded estimates of catches.

Due to the large number of member households, researchers elected to survey samples of households. The ID numbers were used to randomize the households for selection to participate in the project and a list of 50 randomly drawn households in each household category was produced at the beginning of each project year. Technicians would move down the list contacting households, if a contact was unsuccessful, the next household on the list would be added to the sample until a minimum of 30 households had been surveyed to provide adequate statistical confidence. At least 33 households were contacted in each household category during all 3 years (Table 1).

A simple one-page harvest survey instrument listing a number of important fish, birds, eggs and mammals typically harvested in northwest Alaska was created (Appendix 2). The survey form included 26 species and four species groups (ducks, duck eggs, goose eggs, and gull eggs). Species were selected because of their importance in the local harvest and management regimes. For instance, moose are managed closely while snowshoe hares are not, so the survey included moose, but not hares. The same could be said for sheefish or salmon, which were documented, and for smelt or tomcod, which were not. A short species list allowed for simplicity and brevity when administering the survey. The survey form was the same in 2002 and 2003; king crab was added to the survey form in 2004.

Calendars were created with an introduction to the project provided on the cover and included artwork from local students within the theme of harvesting food from the country. The calendars were used as a reminder of the project and for people to record catches made throughout the year to assist with the annual recall effort. However, their greatest value appeared to be in their premium value as a token of appreciation for participating.

After the program was defined as above, a research protocol for the program was developed to provide a standard operating procedure, with ADF&G biometricians providing review and comments (Appendix 3).

In January of each survey year, selected households were contacted, provided with information about the project, and requested to participate. Households that agreed to participate were given a calendar. In the early part of the following year, participating households were contacted again to collect their catch information. Although the calendar was a good way to record catch information, most participants responded to the survey through recall, as they are in the habit of doing through normal conversations throughout the year.

Most of the surveys were completed in person between the field technician and the household representative, although some were dropped off to the respondents to be filled out and returned. Once field data collection was complete, data from the paper survey instruments was entered in a PC computer database.

Reported catch totals were calculated for species by summing the survey reports for all households. For 19 species commonly caught by a majority of the households, such as caribou and salmon, expanded estimates within each household grouping were calculated using formulas provided by ADF&G that multiplies the reported catch by the inverse of the sampling fraction. Estimates of edible pounds were calculated using conversion factors developed by the ADF&G Division of Subsistence. Expanded estimates were not calculated for 11 species (e.g. walrus and brown bear) normally caught in small numbers by a minority of the households, only reported totals were used (Tables 1-3). Expanding take on uncommonly caught animals based on ratios of surveyed to non-surveyed households will result in gross error of actual take with little or no confidence in the estimate.

Alex Whiting calculated the reported and expanded estimated catch totals for each stratum in each year. The data then were delivered to Jim Magdanz, who restructured the data, repeated the analyses, and calculated some additional statistics.

The Sample

In 2002 158 households were surveyed, 121 in 2003, and 108 in 2004. While the numbers dropped each year, in every year for each household category at least 33 or more households were surveyed. As expected, the high and medium-catch households took the majority of fish and wildlife. In an attempt to increase the accuracy of catch estimates, the samples in the high and medium groups were purposefully larger than the samples in the low catch group, especially in 2002. However, it appeared the larger samples in 2002 did not improve overall confidence, so the number of households sampled in the high and medium groups decreased in 2003 and again in 2004.

During the three years, a total of 227 households were surveyed. The percentage of households surveyed in any one category was highest at 77% in the 2002 High category and lowest at 12% in the Low category in both 2003 and 2004. The total number of households surveyed in relation to all possible households was highest the first year at 33% and lowest the last year at 23%, the second year fell in the middle at 26%. The annual samples are summarized in Table 1.

Findings

During the three study years, estimated total harvests varied from 1,401,325 pounds in 2002, to 892,782 pounds in 2003, to 1,022,847 pounds in 2004. Households harvested an average of 5,031 edible pounds of subsistence foods in 2002, 2,996 pounds in 2003, and 3,237 pounds in 2004 (Fig. 1). Five species – caribou, sheefish, bearded seal, chum salmon, and moose – accounted for about 90 percent of the harvest in each of the three study years.

Fish made up 40 to 55 percent of the total harvest by weight, followed by marine and land mammals comprising 20 to 29 percent each. Only about 1 percent of the annual catch was birds and their eggs. Annual marine mammal and bird catches were particularly consistent, with only a 100-pound per household range for marine mammals and a 4-pound per household range for birds (Table 2). The estimated average catch per household was about 1,000 pounds for land mammals, 1,000 pounds for marine mammals, and 1,200 to 2,800 pounds for fish.

Some key findings included:

- Caribou were the most widely caught out of all fish and wildlife available, reported by 69 percent to 85 percent of all households. Moose were caught by about a quarter of all households.

- After caribou, sheefish and chum salmon were the most commonly caught species, with 59 to 79 percent of the households reporting sheefish and 55 to 78 percent of the households reporting chum salmon. Trout were caught by about half of all households. Twenty percent reported catching king crab.
- Bearded seals were the most commonly caught marine mammal; 40 to 47 percent of the households caught bearded seals each year. Seventeen to 33 percent of households took spotted seals, while ringed seals are reported by about 10% of households.
- Ducks were reported by 36 to 49 percent of the households. A quarter to a third of the households reported Canada and white-fronted geese, while 14 to 19 percent report taking snow geese and brant.
- Wolf and wolverine were reported by 2 to 6 percent of all respondents, while lynx were reported by 1 to 2 percent.
- A third of all households gathered seagull eggs. About 10% gathered duck and goose eggs.

The 2002 estimated total harvest was 57 percent greater than in 2003, and 37 percent greater than in 2004; the result of much higher estimated fish harvests and slightly higher land mammal harvests by surveyed households in 2002. Marine mammal harvest estimates changed little in the three survey years.

The substantially higher estimated catches in 2002 were concentrated among the major species. That is, in 2002 the estimated catches of nine of the top ten species (by edible weight) were greater than the average estimated catches in the other two years. Sheefish in 2002 accounted for 465,540 pounds, compared with an average of 217,162 pounds in 2003 and 2004. Likewise, chum salmon catches in 2002 were 56 percent greater than in the other two years, and caribou harvests were 31 percent greater. At the other end of the scale, minor species like trout and geese were about 25 percent less in 2002 than in the other two years. These results do not mean that there was less actual harvest in 2003 and 2004; only they reflect the fact that a few households that harvest a great majority by weight of the total fish catch were surveyed in 2002 and not included in the two following years through random chance.

Discussion

Attempting to estimate harvests of fish and animals in western Alaska's regional centers – Kotzebue, Barrow, Bethel, Nome, Dillingham – is difficult. Regional centers include long-term resident Alaska Native families, Alaska Native immigrants from surrounding villages, and non-Native immigrants from elsewhere in Alaska and the lower 48 states. In regional centers, many households harvest little or no wild foods, while other households harvest thousands of pounds of wild foods. To deal with this variation in harvest levels, simple random samples of regional center populations must be large. Alternatively, as in this study, stratified random samples can help improve estimates.

Comprehensive surveys of Kotzebue have been conducted only twice (Georgette 1992, Fall and Utermohle 1995). Both of those efforts documented harvests in a single year. For 1986, Georgette estimated an average harvest of 1,395 pounds per household. For 1991, Fall and Utermohle estimated 2,674 pounds per household. Georgette used a stratified sample, similar to that used in this project, but included non-Native as well as Native households. Fall and Utermohle's effort was a re-survey of a ten-year-old sample, which biased the sample towards long-term households and at least partially explains the higher estimate in 1992. Figure 5 compares the average household harvests reported in the five surveys.

The average household harvests estimated in this study – 5,031 pounds in 2002, 2,996 pounds in 2003, and 3,237 pounds in 2004 – were higher than those reported in any previous study. That was not unexpected, as this project included only Native households that were members of the Native Village of Kotzebue. In 1986, Georgette found that, on the average Native households harvested five times as much wild food as non-Native households in Kotzebue (1986:182). Georgette also found that four species – caribou, bearded seal, sheefish, and chum salmon – contributed 74 percent of the total harvest. In this project, those same four species contributed 82 to 90 percent of the total harvest (Figure 6).

These results do not include many species of small fish, birds and animals that are harvested, which include: saffron cod, smelt, herring, cisco, whitefish, king salmon, northern pike, grayling, burbot, ptarmigan, hares, porcupine, and other species which are rarely caught, or caught in small numbers. Some of the above are taken in quantity, especially the whitefish, smelt, saffron cod, ptarmigan and hares. This catch is normally shared widely within the community, as are many of the species surveyed. Because the pounds per family and household, is averaged out and includes species that comprise 99 percent of the community harvest by weight, the results will still give a valid minimum amount of annual pounds of catch without including the listed species above. Georgette 1992, Fall and Utermohle 1995, did include these species and found that they had little effect on the overall harvest level results.

References:

Fall, James A., and Charles J. Utermohle, eds.
1995 *An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska. Volume V: Alaska Peninsula and Arctic.* Social and Economic Studies Unit, Minerals Management Service, US Department of the Interior. Anchorage, Alaska.

Georgette, Susan E., and Hannah B. Loon
1992 *Subsistence Use of Fish and Wildlife in Kotzebue, A Northwest Alaska Regional Center.* Division of Subsistence, Alaska Department of Fish and Game, Juneau. Technical Paper 167.

TABLE 1. NUMBER OF HOUSEHOLDS SURVEYED, 2002-2004

	Sampling Strata			
	High Harvesting Households	Medium Harvesting Households	Low Harvesting Households	All Households
2002 Survey				
Total Number of IRA Member Households	90	92	298	480
Number of IRA Households Surveyd	69	49	40	158
Percentage Of Households Surveyed	77 %	53 %	13 %	33 %
Expansion Factor	1.30	1.88	7.45	
2003 Survey				
Total Number of IRA Member Households	89	90	292	471
Number of IRA Households Surveyd	54	33	34	121
Percentage Of Households Surveyed	61 %	37 %	12 %	26 %
Expansion Factor	1.65	2.73	8.59	
2004 Survey				
Total Number of IRA Member Households	89	90	292	471
Number of IRA Households Surveyd	36	36	36	108
Percentage Of Households Surveyed	40 %	40 %	12 %	23 %
Expansion Factor	2.47	2.50	8.11	

TABLE 2. REPORTED, ESTIMATED, AND AVERAGE CATCH, 2002-2004

	2002		2003		2004		Average All Years	
Resource	Number Reported	Number Estimated	Number Reported	Number Estimated	Number Reported	Number Estimated	Number Reported	Number Estimated
Land Mammals								
Moose	41	102	37	94	27	95	35	97
Caribou	1,215	2,376	618	1,719	590	1,915	808	2,003
Sheep	4	4	3	3	2	2	3	3
Brown Bear	8	8	1	1	1	1	3	3
Black Bear	1	1	0	0	3	3	1	1
Land Mammals Sum	1,269	2,491	659	1,816	623	2,016	850	2,108
Marine Mammals								
Beluga	14	14	10	10	8	8	11	11
Walrus	2	2	3	3	16	16	7	7
Bearded Seal	258	533	178	508	164	486	200	509
Ringed Seal	187	265	60	121	27	67	91	151
Spotted Seal	205	532	178	351	96	267	160	383
Ribbon Seal	1	1	3	3	2	2	2	2
Polar Bear	0	0	1	1	1	1	1	1
Marine Mammals Sum	667	1,347	433	996	314	847	471	1,064
Birds								
Ducks	917	2,305	630	2,024	522	2,101	690	2,143
Canadian Geese	401	982	237	781	371	1,270	336	1,011
Snow Geese	111	247	163	394	55	272	110	304
White-Fronted Geese	222	386	234	624	150	462	202	491
Swan	20	36	18	50	13	38	17	41
Crane	22	45	21	59	13	38	19	47
Snowy Owl	5	5	0	0	0	0	2	2
Brant	165	317	216	479	102	371	161	389
Birds Sum	1,863	4,324	1,519	4,411	1,226	4,552	1,536	4,429
Fur Animals								
Wolf	16	16	12	12	22	22	17	17
Wolverine	11	11	13	13	20	20	15	15
Lynx	8	8	1	1	1	1	3	3
Fur Animals Sum	35	35	26	26	43	43	35	35
Fish								
Chum Salmon	22,715	36,748	7,834	19,717	8,987	27,448	13,179	27,971
Trout (Dolly Varden)	1,790	4,023	1,900	5,606	1,456	5,541	1,715	5,057
Sheefish	27,077	41,790	8,189	16,963	7,747	22,024	14,338	26,926
King Crab	-	-	-	-	2,366	6,306	2,366	6,306
Fish Sum	51,582	82,561	17,923	42,287	20,556	61,320	30,020	62,056
Eggs								
Gull Eggs	1,774	3,166	1,513	4,373	1,024	3,123	1,437	3,554
Goose Eggs	154	242	255	660	153	386	187	429
Duck Eggs	92	160	182	525	23	57	99	247
Eggs Sum	2,020	3,568	1,950	5,558	1,200	3,566	1,723	4,230

TABLE 3. REPORTED AND ESTIMATED CATCH, 2002

	Households Harvesting	Reported Total Harvest		Harvest Data Expanded	Estimated Total Harvest By IRA Member Households		Average Household Harvest	95 % Confidence Interval
Resource	Percentage	(Number)	(Pounds)		(Number)	(Pounds)	(Pounds)	(± %)
Land Mammals								
Moose	25%	41	22,058	Yes	102	55,000	139.6	27%
Caribou	85%	1,215	165,240	Yes	2,376	323,156	1,045.8	24%
Sheep	3%	4	416	No	4	416	2.6	-
Brown Bear	5%	8	0	No	8	0	0.0	-
Black Bear	1%	1	88	No	1	88	0.6	-
Land Mammals Sum		1,269	187,802		2,491	378,660	1,188.6	25%
Marine Mammals								
Beluga	7%	14	13,930	No	14	13,930	88.2	-
Walrus	1%	2	1,540	No	2	1,540	9.7	-
Bearded Seal	47%	258	108,360	Yes	533	223,790	685.8	29%
Ringed Seal	16%	187	13,838	Yes	265	19,638	87.6	60%
Spotted Seal	33%	205	20,090	Yes	532	52,109	127.2	38%
Ribbon Seal	1%	1	0	No	1	0	0.0	-
Polar Bear	0%	0	0	No	0	0	0.0	-
Marine Mammals Sum		667	157,758		1,347	311,007	998.5	31%
Birds								
Ducks	49%	917	1,724	Yes	2,305	4,334	10.9	24%
Canadian Geese	34%	401	1,371	Yes	982	3,359	8.7	34%
Snow Geese	14%	111	443	Yes	247	986	2.8	79%
White-Fronted Geese	26%	222	941	Yes	386	1,636	6.0	36%
Swan	7%	20	224	Yes	36	406	1.4	62%
Crane	9%	22	149	Yes	45	304	0.9	54%
Snowy Owl	1%	5	14	No	5	14	0.1	-
Brant	15%	165	376	Yes	317	723	2.4	56%
Birds Sum		1,863	5,242		4,324	11,761	33.2	37%
Fur Animals								
Wolf	5%	16	0	No	16	0	0.0	-
Wolverine	3%	11	0	No	11	0	0.0	-
Lynx	2%	8	0	No	8	0	0.0	-
Fur Animals Sum		35	0		35	0	0.0	-
Fish								
Chum Salmon	78%	22,715	136,290	Yes	36,748	220,490	862.6	53%
Trout (Dolly Varden)	56%	1,790	5,907	Yes	4,023	13,276	37.4	27%
Sheefish	79%	27,077	301,638	Yes	41,790	465,540	1,909.1	44%
Fish Sum		51,582	443,835		82,561	699,306	2,809.1	46%
Eggs								
Gull Eggs	27%	1,774	284	Yes	3,166	507	1.8	0%
Goose Eggs	9%	154	39	Yes	242	60	0.2	75%
Duck Eggs	5%	92	14	Yes	160	24	0.09	80%
Eggs Sum		2,020	336		3,568	591	2.1	11%
Grand Total		57,436	794,973		94,326	1,401,325	5,031.5	37%

TABLE 4. REPORTED AND ESTIMATED CATCH, 2003

	Households Harvesting	Reported Total Harvest		Harvest Data Expanded	Estimated Total Harvest By IRA Member Households		Average Household Harvest	95 % Confidence Interval
Resource	Percentage	(Number)	(Pounds)		(Number)	(Pounds)	(Pounds)	(± %)
Land Mammals								
Moose	21%	37	19,906	Yes	94	50,396	164.5	47%
Caribou	69%	618	84,048	Yes	1,719	233,735	694.6	19%
Sheep	2%	3	312	No	3	312	2.6	-
Brown Bear	1%	1	0	No	1	0	0.0	-
Black Bear	0%	0	0	No	0	0	0.0	-
Land Mammals Sum		659	104,266		1,816	284,443	861.7	24%
Marine Mammals								
Beluga	5%	10	9,950	No	10	9,950	82.2	-
Walrus	2%	3	2,310	No	3	2,310	19.1	-
Bearded Seal	40%	178	74,760	Yes	508	213,309	617.9	34%
Ringed Seal	11%	60	4,440	Yes	121	8,949	36.7	71%
Spotted Seal	17%	178	17,444	Yes	351	34,355	144.2	68%
Ribbon Seal	2%	3	0	No	3	0	0.0	-
Polar Bear	1%	1	0	No	1	0	0.0	-
Marine Mammals Sum		433	108,904		996	268,874	900.0	40%
Birds								
Ducks	36%	630	1,184	Yes	2,024	3,805	9.8	33%
Canadian Geese	26%	237	811	Yes	781	2,672	6.7	39%
Snow Geese	18%	163	650	Yes	394	1,573	5.4	54%
White-Fronted Geese	24%	234	992	Yes	624	2,645	8.2	42%
Swan	11%	18	202	Yes	50	561	1.7	61%
Crane	8%	21	142	Yes	59	396	1.2	73%
Snowy Owl	0%	0	0	No	0	0	0.0	-
Brant	19%	216	492	Yes	479	1,093	4.1	79%
Birds Sum		1,519	4,473		4,411	12,745	37.0	23%
Fur Animals								
Wolf	3%	12	0	No	12	0	0.0	-
Wolverine	2%	13	0	No	13	0	0.0	-
Lynx	1%	1	0	No	1	0	0.0	-
Fur Animals Sum		26	0		26	0	0.0	-
Fish								
Chum Salmon	55%	7,834	47,004	Yes	19,717	118,304	388.5	42%
Trout (Dolly Varden)	45%	1,900	6,270	Yes	5,606	18,500	51.8	44%
Sheefish	59%	8,189	91,225	Yes	16,963	188,973	753.9	59%
Fish Sum		17,923	144,499		42,287	325,777	1,194.2	52%
Eggs								
Gull Eggs	30%	1,513	242	Yes	4,373	700	2.0	0%
Goose Eggs	12%	255	64	Yes	660	165	0.5	69%
Duck Eggs	10%	182	27	Yes	525	79	0.23	68%
Eggs Sum		1,950	333		5,558	943	2.8	18%
Grand Total		22,510	362,476		55,095	892,782	2,995.7	39%

TABLE 5. REPORTED AND ESTIMATED CATCH, 2004

Resource	Households Harvesting Percentage	Reported Total Harvest (Number)	Reported Total Harvest (Pounds)	Harvest Data Expanded	Estimated Total Harvest By IRA Member Households (Number)	Estimated Total Harvest By IRA Member Households (Pounds)	Average Household Harvest (Pounds)	95 % Confidence Interval (± %)
Land Mammals								
Moose	22%	27	14,526	Yes	95	51,215	134.5	37%
Caribou	76%	590	80,240	Yes	1,915	260,459	743.0	20%
Sheep	2%	2	208	No	2	208	1.9	-
Brown Bear	1%	1	0	No	1	0	0.0	-
Black Bear	2%	3	264	No	3	264	2.4	-
Land Mammals Sum		623	95,238		2,016	312,146	881.8	23%
Marine Mammals								
Beluga	5%	8	7,960	No	8	7,960	73.7	-
Walrus	3%	16	12,320	No	16	12,320	114.1	-
Bearded Seal	40%	164	68,880	Yes	486	204,272	637.8	32%
Ringed Seal	6%	27	1,998	Yes	67	4,952	18.5	85%
Spotted Seal	19%	96	9,408	Yes	267	26,161	87.1	70%
Ribbon Seal	2%	2	0	No	2	0	0.0	-
Polar Bear	1%	1	0	No	1	0	0.0	-
Marine Mammals Sum		314	100,566		847	255,664	931.2	37%
Birds								
Ducks	41%	522	981	Yes	2,101	3,950	9.1	35%
Canadian Geese	33%	371	1,269	Yes	1,270	4,343	11.7	49%
Snow Geese	14%	55	219	Yes	272	1,085	2.0	62%
White-Fronted Geese	22%	150	636	Yes	462	1,959	5.9	49%
Swan	8%	13	146	Yes	38	425	1.3	70%
Crane	6%	13	88	Yes	38	256	0.8	90%
Snowy Owl	0%	0	0	No	0	0	0.0	-
Brant	16%	102	233	Yes	371	846	2.2	68%
Birds Sum		1,226	3,572		4,552	12,864	33.1	24%
Fur Animals								
Wolf	6%	22	0	No	22	0	0.0	-
Wolverine	3%	20	0	No	20	0	0.0	-
Lynx	1%	1	0	No	1	0	0.0	-
Fur Animals Sum		43	0		43	0	0.0	-
Fish								
Chum Salmon	68%	8,987	53,922	Yes	27,448	164,689	499.3	44%
Trout (Dolly Varden)	56%	1,456	4,805	Yes	5,541	18,287	44.5	41%
Sheefish	63%	7,747	86,302	Yes	22,024	245,352	799.1	80%
King Crab	19%	2,366	4,969	Yes	6,306	13,242	46.0	65%
Fish Sum		20,556	149,997		61,320	441,569	1,388.9	48%
Eggs								
Gull Eggs	26%	1,024	164	Yes	3,123	500	1.5	50%
Goose Eggs	10%	153	38	Yes	386	97	0.4	78%
Duck Eggs	3%	23	3	Yes	57	9	0.03	136%
Eggs Sum		1,200	206		3,566	605	1.9	56%
Grand Total		23,962	349,578		72,343	1,022,847	3,236.8	37%

FIGURE 1. AVERAGE HOUSEHOLD CATCH BY CATEGORY, 2002- 2004

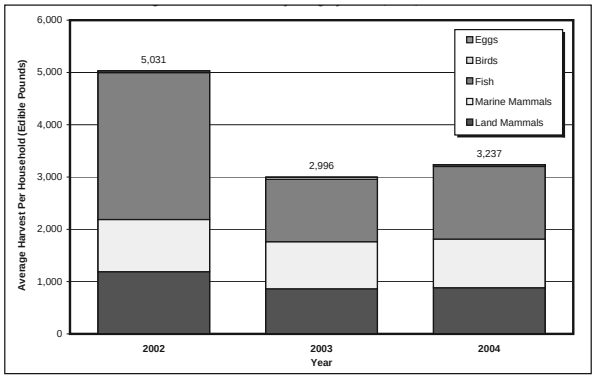


FIGURE 2. COMPOSITION OF TOTAL CATCH IN POUNDS, 2002-2004

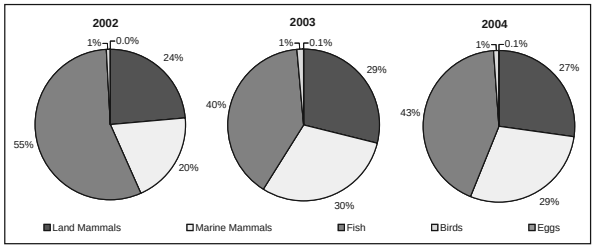


FIGURE 3. REPORTED AND ESTIMATED TOTAL CATCH IN 3 MAJOR CATEGORIES, 2002-2004

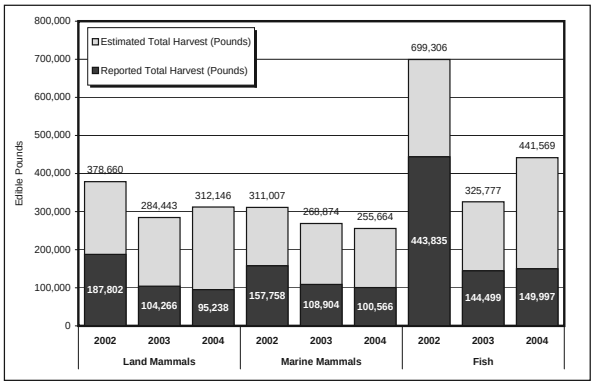


FIGURE 4. ESTIMATED TOTAL CATCH IN 3 MAJOR CATEGORIES, WITH CONFIDENCE INTERVALS, 2002-2004

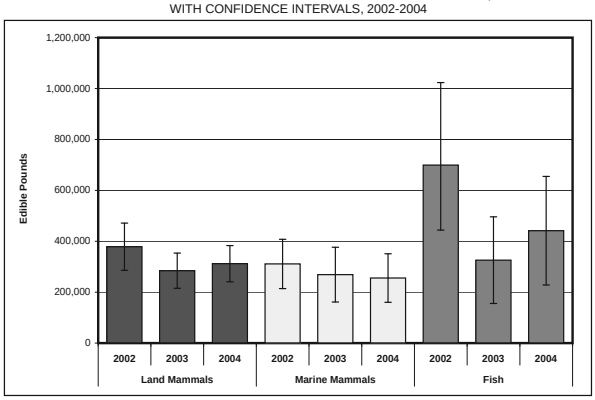


FIGURE 5. ESTIMATED CATCH, KOTZEBUE, 1986, 1991, AND 2002-2004

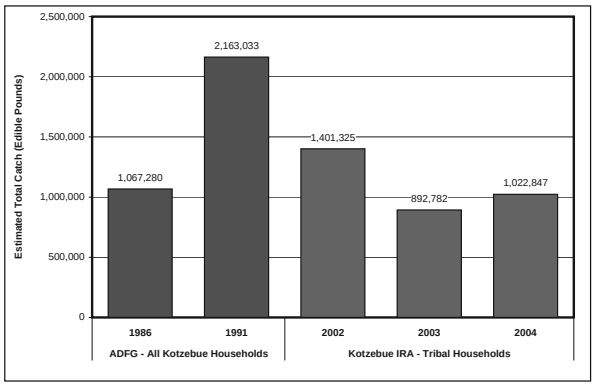
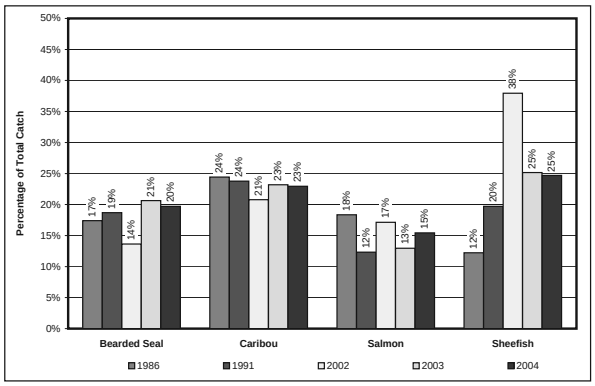


FIGURE 6. PROPORTIONS OF FOUR MAJOR SPECIES IN FIVE SURVEY YEARS



Appendix 1: Harvest Category Questionnaire

Kotzebue IRA – Member Harvest Survey – Use Category Determination

The Kotzebue IRA is beginning an effort to document the actual amounts of food harvested by our members. This information will be anonymous and used in the future to fight for allocation of resources on behalf of the Qikiktagrugmiut. All members possible will be surveyed initially to determine their level of harvest, this information will be used during the next part of the effort with a percentage of each user level being asked to keep track of their harvest during the calendar year.

Thank you for your participation and support of our Tribe.

(1) Last year did your household catch at least ten (caribou) tuttu or five (seals) natchiq, qasigiaq, ugruk or 1,000 pounds of non-commercial (fish) aqaluk?

YES NO

(2) Last year did your household catch at least five (caribou) tuttu or two (seals) natchiq, qasigiaq, ugruk or 500 pounds of non-commercial (fish) aqaluk?

YES NO

Appendix 2: Harvest Survey Collection Form

Kotzebue IRA
P.O. Box 296
Kotzebue Ak, 99752
Ph 442-3467 Fax 442-2162
Harvest Survey

Land Mammals
Moose ☐
Caribou ☐
Sheep ☐
Grizzly Bear ☐
Black Bear ☐

Fur Animals
Wolf ☐
Wolverine ☐
Lynx ☐

Marine Mammals
Beluga ☐
Walrus ☐
Bearded Seal ☐
Ringed Seal ☐
Spotted Seal ☐
Ribbon Seal ☐
Polar Bear ☐

Fish
Chum Salmon ☐
Trout ☐
Shee-Fish ☐
King Crab ☐

Birds
Ducks ☐
Canadian Geese ☐
Snow Geese ☐
Speckled Bellies ☐
Swan ☐
Crane ☐
Snowy Owl ☐
Brant ☐

Eggs
Seagull ☐
Duck ☐
Geese ☐

ID# ☐

Appendix 3: Harvest Survey Program Protocol

Native Village of Kotzebue Harvest Survey Program

1. Using city maps and membership listings, along with a technician with an intimate knowledge (from living here his entire life and driving cab for many years) of members, their families and residences, a survey of all houses, apartments and camps (households) in the vicinity of Kotzebue for residing adult members was completed. A list was created with all the house and apartment numbers and camps where members resided.

2. Attempt to contact all households (personal visit or phone) on residences list with the initial category questionnaire, consisting of: Your household caught more then 10 caribou, and/or 5 seals, and/or more then 1000 pounds of non-commercial fish? = High – Your household caught more then 5 caribou and/or 2 seals and/or 500 pounds of non-commercial fish = Medium – Your household caught less then the medium limits = low. Were able to contact all households with members currently living there at least once for this first categorization.

3. Using the responses received from the above survey all respondents were listed and grouped into the appropriate categories.

4. The plan is to try and get all or as many highs as we can and at least 30 of each the low and medium for a statistical sampling. Using a random number selector on excel program all the medium and low households were fed into the program and randomly sorted, we used the first 50 households in each category as the participants, these households were contacted the same as above. We used an "extra" 20 in each category so we could have a reasonable chance of getting at least 30 respondents reporting in each category at the end of the year. It is our understanding that 30 is a sufficient number to do a random sample.

5. Calendars were created and provided in December to the HH's selected for participation as a tool for recording daily/weekly/monthly-harvesting activity; actual recall would be done from memory. Many people do use the calendars; the rest seemed to have a pretty easy time remembering their harvest, especially the bigger game animals.

6. A survey instrument was developed listing all those available wildlife resources that currently have or may have in the future a significant management interest (e.g. include caribou, geese, but not rabbits, ptarmigan) – 30 different species or their eggs were listed. This sheet is used by the technician to record harvest levels for each surveyed species by each household participating. In January of the following year all households on the randomized list and the highs using the HH list and working from top to bottom are contacted and asked about their harvesting activity during the previous calendar year.

7. The program technician collects all of the responses mostly face to face, they can be left to be picked up later. If after a couple of contacts there is no response, the HH is listed as non-responsive and the next HH on the bottom of the list takes the place of that HH until between 30 and 40 HH's in each category are surveyed. The results were listed in the appropriate categories for the appropriate user groups and tallied.

8. These results are then weighted using the weighting formula provided by Kotzebue ADF&G subsistence division.

9. The weighted numbers are then rounded off using an even rounding formula - that is all number were rounded up or down based on 4 and lower and 6 and higher with the ones being 5 being rounded to the nearest even number (e.g. 18.5 = 18, 19.5 = 20)

10. The weighted rounded off numbers were then tallied and stored on each user group sheet with a grand total for all users being created.

The Native Village of Kotzebue is the Federally-recognized Tribal government representing the Qikiqtagrukmiut, the original inhabitants of the area of northwest Alaska surrounding modern day Kotzebue (Qikiqtagruk). The Tribe, a sovereign entity, is commonly called the Kotzebue IRA due to its organization pursuant to the 1934 Indian Reorganization Act and as amended for Alaska in 1936.

Membership of the Kotzebue IRA is estimated at 2500 persons, most of who belong to the original families of Qikiqtagruk, although native peoples from other Tribes are members of the Kotzebue IRA.

Kotzebue IRA
Post Office Box 296
Kotzebue, Alaska 99752-0296

Phone: 907-442-3467
Fax: 907-442-2162

BOEM-2014-0078-0039

KENAI PENINSULA BOROUGH
144 North Binkley St., Soldotna, Alaska 99669-7520
1-800-478-4441, Ext. 2150 • 907-714-2150 • Fax 907-714-2377
mayor@borough.kenai.ak.us

December 1, 2014

Walter D. Cruickshank, PhD
Acting Director, Bureau of Ocean Energy Management
BOEM, Alaska OCS Region
380 I Centerpoint Drive Suite 500
Anchorage, Alaska 99503-5823

Re: Comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Dr. Cruickshank,

I am supportive of Arctic drilling and see it as a critical component to the future health of the State of Alaska. A robust oil and gas industry in the Arctic provides benefits throughout our State, including the Kenai Peninsula Borough. With $6 billion in investments by oil and gas companies to date, it is clear that there is strong interest in the development of Arctic resources.

The Bureau of Ocean and Energy Management currently has a Draft Supplemental Environmental Impact Statement (SEIS) before you. I would ask that the BOEM swiftly issue a Record of Decision that will allow companies to explore and develop in the Chukchi Sea in 2015.

There is broad support for Arctic drilling. The draft (SEIS) recently released by BOEM for public comment is the next step toward that end. I'm asking BOEM to meet its deadline for approval by March 2015 and avoid any actions that would preclude that goal.

The benefits of an Arctic drilling program are clear. The Arctic holds an estimated 27 billion barrels of oil and will generate approximately $200 Billion for the federal treasury. Of critical importance to the State of Alaska is the addition of up to 700,000 new barrels of oil through the Alaska Pipeline daily.

Thank you for the opportunity to comment on the Draft SEIS. Please issue a Record of Decision that will allow companies to begin operations in 2015.

Sincerely

Mike Navarre
Mayor
Kenai Peninsula Borough

BOEM-2014-0078-0198

MUNICIPALITY OF ANCHORAGE

Office of the Mayor

Phone: 907-343-7100
FAX: 907-343-7180

Mayor Dan Sullivan

December 19, 2014

Walter D. Cruickshank, PhD
Acting Director, Bureau of Ocean Energy Management
BOEM, Alaska OCS Region
380 I Centerpoint Drive Suite 500
Anchorage, Alaska 99503-5823

Re: Comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Dr. Cruickshank,

I'm writing to express my strong support for the Bureau of Ocean and Energy Management's Draft Supplemental Environmental Impact Statement (SEIS) and ask that BOEM swiftly issue a Record of Decision that will allow companies to explore and develop in the Chukchi Sea in 2015.

After eight years and $6 billion dollars worth of investment by oil and gas companies it's time for Arctic drilling. The draft (SEIS) recently released by BOEM for public comment is the next step toward that end. I'm asking BOEM to meet its deadline for approval by March 2015 and avoid any actions that would preclude that goal.

I can't overemphasize the importance of moving this project forward. An estimated 27 billion barrels of oil, 55,000 jobs, a $145 Billion dollar payroll, $200,000 Billion in the federal treasury and 700,000 new barrels of oil through the Alaska Pipeline, are all at stake.

Alaskans stand firmly behind Arctic drilling. Our Congressional delegation is with us. Companies have developed practices, technologies and standards to drill safely.

Thank you for the opportunity to comment on the Draft SEIS. Please issue a Record of Decision within your stated timeline so that companies can begin operations in 2015.

Sincerely

Mayor

P.O. Box 196650 ◆ Anchorage, Alaska 99519-6650 ◆ http://www.muni.org

Other Local Governments

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PUBLIC SUBMISSION

As of: December 22, 2014
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Posted: December 22, 2014
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Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0174
Comment from Ken Bragg, NA

Submitter Information

Name: Ken Bragg
Address:
63 Pinecrest Circle
Sheridan, AR, 72150
Email: kenbragg@windstream.net
Phone: 8709425269
Organization: NA

General Comment

December 19, 2014
Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

RE: Public Comments on Draft Supplemental Environmental Impact Statement for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Mr. Routhier,

Arkansas has seen a tremendous economic impact over the last eight years from the development of natural gas production. The technological advances in hydraulic fracturing and horizontal drilling have enabled companies to capture previously inaccessible natural gas deposits in the Fayetteville Shale. It has also greatly benefitted our states economy by providing about 92,500 jobs, with labor income totaling $4.2 billion annually.

This benefit has occurred because of the utilization of the newest and safest technologies and industry best practices which result not only in economic development but environmental protection of our natural resource. This proven record of sound and responsible development can also be

applied to the energy development in the Chukchi Sea and other Arctic waters. The economic impact would be significant according to a study by University of Alaska Institute of Social and Economic Research. This study indicates that the development of the oil production in the Outer Continental Shelf (OCS) would generate $193 billion in revenue through 2057, with $167 billion going to the federal government and $6.5 billion to other states.

We should not let red tape and costly regulations that do not enhance protection stop the production of a readily available resource that will help the United States reach energy independence. I urge BOEM to finalize the SEIS for Lease Sale 193 so we can begin to harness the tremendous potential that exists off Alaskas coast.

Sincerely,

Ken Bragg
Majority Leader
Arkansas House of Representatives

Attachments

Alaska OCS Region BOEM 2014 0078

file:///S|/...20DAYS/Lease%20Sale%20193/FDMS%20Downloads/Documents%202014-0078-0173&4_Docs/BOEM-2014-0078-0174.html[12/22/2014 2:50:28 PM]

REPRESENTATIVE
Ken Bragg
63 Pinecrest Circle
Sheridan, Arkansas 72150-9704

870-942-5269 Residence
kenbragg@windstream.net

DISTRICT 15

Counties:
Part Grant
Part Hot Spring
Part Jefferson

COMMITTEES

Revenue and Taxation
Vice Chairperson, Sales, Use, Miscellaneous Taxes and Exemptions Subcommittee

Aging, Children and Youth, Legislative and Military Affairs
Legislative, Military and Veterans Affairs Subcommittee

Joint Committee on Energy

Legislative Joint Auditing Committee

STATE OF ARKANSAS

House of Representatives

December 19, 2014

Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

RE: Public Comments on Draft Supplemental Environmental Impact Statement for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Mr. Routhier,

Arkansas has seen a tremendous economic impact over the last eight years from the development of natural gas production. The technological advances in hydraulic fracturing and horizontal drilling have enabled companies to capture previously inaccessible natural gas deposits in the Fayetteville Shale. It has also greatly benefitted our state's economy by providing about 92,500 jobs, with labor income totaling $4.2 billion annually.

This benefit has occurred because of the utilization of the newest and safest technologies and industry best practices which result not only in economic development but environmental protection of our natural resource. This proven record of sound and responsible development can also be applied to the energy development in the Chukchi Sea and other Arctic waters. The economic impact would be significant according to a study by University of Alaska Institute of Social and Economic Research. This study indicates that the development of the oil production in the Outer Continental Shelf (OCS) would generate $193 billion in revenue through 2057, with $167 billion going to the federal government and $6.5 billion to other states.

We should not let red tape and costly regulations that do not enhance protection stop the production of a readily available resource that will

REPRESENTATIVE
Ken Bragg
63 Pinecrest Circle
Sheridan, Arkansas 72150-9704

870-942-5269 Residence
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DISTRICT 15

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COMMITTEES

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Aging, Children and Youth, Legislative and Military Affairs
Legislative, Military and Veterans Affairs Subcommittee

Joint Committee on Energy

Legislative Joint Auditing Committee

STATE OF ARKANSAS

House of Representatives

help the United States reach energy independence. I urge BOEM to finalize the SEIS for Lease Sale 193 so we can begin to harness the tremendous potential that exists off Alaska's coast.

Sincerely,

Ken Bragg
Majority Leader
Arkansas House of Representatives

BOEM-2014-0078-0147

December 18, 2014

Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

Re: Comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Mr. Routhier,

I support the Bureau of Ocean and Energy Management (BOEM) Draft Supplemental Environmental Impact Statement (SEIS) and ask that BOEM quickly issue a Record of Decision (ROD) that will allow companies to move forward conducting oil and natural gas exploration and development in the Chukchi Sea in 2015.

American energy independence and national security are important topics linked through oil production and distribution. As the recent decline in oil prices have shown, states that rely on oil exports like Russia, Nigeria, and the OPEC countries rely heavily on high global oil prices. Not only will additional U.S. oil production increase our national security by preventing us from needing to buy oil from authoritarian regimes, but it will also reduce the cost of oil worldwide, further weakening these regimes. Approval of this project is a no-brainer when it comes to these issues.

Furthermore, I'm tired of projects being halted due to environmental concerns, especially when the environmental impact is negligible. We need to take advantage of our nation's natural resources as we continue to pull out of the Great Recession. We are at risk of the Trans-Alaska Pipeline being shut down because not enough oil is being pumped through it. This project will help keep a vital economic resource up and running, and will help prevent us from slipping into another recession.

Thank you for taking the time to consider my comments today. I urge you to finalize the SEIS as quickly as possible. It's important that we keep to the stated deadline for draft comments, and ensure that a Record of Decision is approved that enables companies to begin operations in 2015.

Sincerely,

Paul Aziz
Mayor
Lebanon, Oregon

Environmental Organizations

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PUBLIC SUBMISSION

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0136
Comment from Leah Donahey, Alaska Wilderness League

Submitter Information

Name: Leah Donahey
Address:
Alaska Wilderness League
122 C Street NW, Ste. 240
Washington, DC, 20001
Email: leah@alaskawild.org
Organization: Alaska Wilderness League

General Comment

The Honorable Sally Jewell
Secretary of the Interior
Department of the Interior
1849 C Street, NW
Washington DC 20240

Dear Secretary Jewell,

I am writing on behalf of organizations representing nearly thirty thousand people from New Jersey who wanted to comment on future drilling and leasing decisions in the Arctic Ocean. We hope you will consider information in the attached letter when you decide next steps for Lease Sale 193 and other upcoming Arctic Ocean oil and gas decisions.

Thanks for your efforts to ensure that the public has an opportunity to comment on leasing and drilling decisions in the Arctic Ocean.

Sincerely,

Leah Donahey
Arctic Ocean Campaign Director
Alaska Wilderness League

Attachments

Arctic Ocean NJ Coaltion Letter Final

file:///S|/...cument%20List%2018-12-2014%2019/Document%20List%2018-12-2014%2019-23-58-308_docs/BOEM-2014-0078-0136.html[12/19/2014 12:04:48 PM]

President Barack Obama
1600 Pennsylvania Avenue NW
Washington, DC 20500

December 17, 2014

Dear President Obama,

We, the undersigned organizations in New Jersey representing nearly thirty thousand people write to urge you to replace existing plans for drilling in the Arctic Ocean with a new standard that protects this valuable ecosystem and acknowledges the climate change implications associated with drilling for fossil fuels.

America's Arctic Ocean – the Beaufort and Chukchi Seas – is central to the Inupiat people who live along its shores and refer to it as their "garden." It is home to countless species of wildlife including polar bears, walrus, ice seals, endangered bowhead whales, beluga whales and eiders. While our Arctic Ocean supports an abundance of life, it is also an environment of extremes; sub-zero temperatures, long periods of darkness, shifting ice floes, hurricane force winds and 20-foot seas. Those hazards, combined with the Arctic's importance to so many people and marine species, makes the Arctic Ocean an important region, the conservation of which you should prioritize over unsafe drilling.

The past decade has seen a heavy-handed push to pursue oil and gas drilling in the Arctic Ocean, with little regard to safety or environmental impacts. Shell Oil attempted to begin exploratory drilling in 2012 but was stymied by mechanical failures, volatile weather and its drilling rig running aground. This failed attempt demonstrated what many already knew, that drilling should not occur in the Arctic Ocean. As the recent fracking rush has revealed, oil and gas companies are more than willing to sacrifice communities and ecosystems in the name of profits and the same would hold true in the Arctic Ocean. An environment like no other, the Arctic Ocean presents challenges that neither the oil companies nor our government agencies are properly prepared for.

Today, America's Arctic Ocean is not just threatened by oil companies, but is also at the front lines of climate change. The Arctic ice cap is our planet's air conditioner. The Arctic is warming at approximately twice the rate of the rest of the world, and because the polar ice cap functions as the air conditioner for the entire Northern Hemisphere, what impacts the Arctic can seriously impact the rest of us, including here in New Jersey. Loss of sea ice cover in the fall has already been linked to extreme weather patterns all over the country. To add insult to injury, fossil fuel development in the Arctic Ocean would release as much carbon dioxide into our atmosphere as will be released by all modes of U.S. transportation during the next 9 years.

We, the undersigned, ask that you and our elected representatives in Washington, DC, support the protection of America's Arctic Ocean by stopping oil and gas development. Preserving these sensitive and vital waters from exploration and exploitation is in our national interest, for today and future generations.

Sincerely,

350NJ
Rosemary Dreger – 350NJ organizer
Bergen, NJ

Alaska Wilderness League
Monica Scherer – Mid-Atlantic Field Representative
Phoenixville, PA

ClimateMama
Harriet Shugarman – Executive Director
Wcykoff, NJ

Delaware and Raritan Canal Watch
Linda Barth – Co-President
Rocky Hill, NJ

Environmental Committee for the town of Secaucus
Amanda Nesheiwat
Secaucus, NJ

Food and Water Watch
Wenonah Hauter – Executive Director
Washington D.C.

Franciscan Response to Fracking (St. Mary's Parish)
Jacquelyn Schramm – Social Justice Director
Pompton Lakes, NJ

GreenFaith
Rev. Fletcher Harper – Executive Director
Highlands Park, NJ

New Jersey Sierra Club
Nicole Dallara – Outreach Coordinator
Trenton, NJ

New Jersey Sustainable Collegiate Partners
Amanda Nesheiwat - Chair
Ramapo, NJ

SURGE (Students United for a Responsible Global Environment)
Isaac Lederman – Co-Chair
Princeton, NJ

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Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0264
Comment from Erik Grafe, Earthjustice, et al.

Submitter Information

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Earthjustice
441 W 5th Avenue, Suite 301
Anchorage, AK, 99501
Email: egrafe@earthjustice.org
Organization: Earthjustice, et al.

General Comment

Attached is part nine of the attachments in support of Alaska WIlderness League, et al.'s comments on the second
supplemental draft environmental impact statement for Chukchi Lease Sale 193. The comments were submitted at tracking
number 1jy-8g7f-3mza.

Attachments

Alaska Wilderness League, et al, Attachment, part 9

Representative of Alaska Wilderness League Submittal | Document too voluminous to include in SEIS | All information reviewed and considered

Attachments to Alaska Wilderness League, et al., Comments on Second Supplemental Environmental Impact Statement for Chukchi Sea Oil and Gas Lease Sale 193, BOEM-2014-0078[1]

Alaska Wilderness League, et al., Comments on the Bureau of Ocean Energy Management's regulations of air emissions from drilling operations on the Alaska Outer Continental Shelf; Docket No. BOEM-2013-0035 (June 21, 2013)

Australian Maritime Safety Authority, Oil Spill Trajectory Model Top 30 Questions

Bailey, A., Chukchi Sea Depths Hold Vast Environmental Complexities, Alaska Dispatch News (Apr. 23, 2012)

Jeffrey F. Bromaghin, et al., In press. Polar bear population dynamics in the southern Beaufort Sea during a period of sea ice decline. Ecological Applications

Judah Cohen et al., Warm Arctic, cold continents: A common pattern related to Arctic sea ice melt, snow advance, and extreme winter weather, Oceanography 26(4) (2013)

Council on Environmental Quality, Fact Sheet: Guidance on Considering Climate Change in NEPA Reviews and Conducting Programmatic NEPA Reviews (Dec. 18, 2014)

Council on Environmental Quality, Revised Draft Guidance on Consideration of Greenhouse Gas Emissions and Climate Change in National Environmental Policy Act Evaluations (Dec. 2014)

Council on Environmental Quality, Letter to Joseph Mendelson, III, et al., Re. CEQ's Response to a Petition for Rulemaking and Issuance of Guidance to Require Inclusion of Climate Change Analyses in NEPA Documents (Aug. 7, 2014)

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[1] These documents are cited in the comment letter and provided to BOEM under separate submission through regulations.gov. BOEM must consider these documents and include them in the administrative record.

Representative of Alaska Wilderness League Submittal | Document too voluminous to include in SEIS | All information reviewed and considered

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Representative of Alaska Wilderness League Submittal | Document too voluminous to include in SEIS | All information reviewed and considered

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USA v. Noble Drilling (U.S.) LLC, Minutes, Case No. 3:14-cr-00114-RRB (Dec. 19, 2014)

USA v. Noble Drilling (U.S.) LLC, Plea Agreement, Case No. 3:14-cr-00114-RRB (Dec. 8, 2014)

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U.S. Department of State, Draft Supplemental Environmental Impact Statement for the Keystone XL Project (Mar. 2013) (excerpts)

U.S. Department of State, Final Supplemental Environmental Impact Statement for the Keystone XL Project (Jan. 2014) (excerpts)

U.S. Geological Survey, Arctic Sea Ice Decline: Projected Changes in Timing and Extent of Sea Ice in the Bering and Chukchi Seas, Open-File Report 2010-1176 (2010)

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PUBLIC SUBMISSION

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Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0138
Comment from Leah Donahey, Alaska Wilderness League

Submitter Information

Name: Leah Donahey
Address:
Alaska Wilderness League
122 C Street NW, Ste 240
Washington, DC, 20001
Email: leah@alaskawild.org
Organization: Alaska Wilderness League

General Comment

The Honorable Sally Jewell
Secretary of the Interior
Department of the Interior
1849 C Street, NW
Washington DC 20240

Dear Secretary Jewell,

I am writing on behalf of individuals and organizations representing thousands of Iowans who wanted to comment on future drilling and leasing decisions in the Arctic Ocean. We hope you will consider information in the attached letter when you decide next steps for Lease Sale 193 and other upcoming Arctic Ocean oil and gas decisions.

Thanks for your efforts to ensure that the public has an opportunity to comment on leasing and drilling decisions in the Arctic Ocean.

Sincerely,

Leah Donahey
Arctic Ocean Campaign Director
Alaska Wilderness League

Attachments

Arctic OCS CC signon 12-2014 FNL

file:///S|/...cument%20List%2018-12-2014%2019/Document%20List%2018-12-2014%2019-23-58-308_docs/BOEM-2014-0078-0138.html[12/19/2014 12:06:28 PM]

President Barack Obama
1600 Pennsylvania Avenue NW
Washington, DC 20500

December 17, 2014

Dear President Obama,

We, the undersigned individuals and organizations representing thousands of Iowans, write to urge you to replace existing plans for drilling in the Arctic Ocean with a new standard that protects this valuable ecosystem and acknowledges the climate change implications associated with drilling for fossil fuels.

America's Arctic Ocean – the Beaufort and Chukchi Seas – is central to the Inupiat people who live along its shores and refer to it as their "garden." It is home to countless species of wildlife including polar bears, walrus, ice seals, endangered bowhead whales, beluga whales and eiders. While our Arctic Ocean supports an abundance of life, it is also an environment of extremes; sub-zero temperatures, long periods of darkness, shifting ice floes and hurricane force winds. These hazards, combined with the Arctic's importance to so many people and marine species, makes the Arctic Ocean an important region, and one you should protect rather than subject to unsafe drilling.

The past decade has seen a heavy-handed push to pursue oil and gas drilling in the Arctic Ocean, with little regard to safety or environmental impacts. Shell Oil attempted to begin exploratory drilling in 2012 but was stymied by mechanical failures, volatile weather and its drilling rig running aground. This failed attempt demonstrated what many already knew, that drilling should not occur in the Arctic Ocean.

We applaud the recent announcement on the proposal to limit carbon pollution standards from existing power plants. The proposed rule is a major step towards addressing climate change, and we thank the administration and EPA for this leadership. Besides limiting emissions, our country must also do more to shift away from fossil fuel use and transition to clean, renewable energy.

What happens in the Arctic doesn't stay in the Arctic. One effective way to slow climate change and its impacts in the Lower 48 is to protect areas that haven't been opened to intensive drilling, like America's Arctic. An environment like no other, the Arctic Ocean presents challenges that neither the oil companies nor our government agencies are properly prepared for.

Today, America's Arctic Ocean is not just threatened by oil companies, but is also at the front lines of climate change. The Arctic ice cap acts as our planet's air conditioner. The Arctic is warming at approximately twice the rate of the rest of the world, and because the polar ice cap functions as the air conditioner for the entire Northern Hemisphere, what impacts the Arctic can seriously impact the rest of us, including businesses and individuals here in Iowa. Loss of sea ice cover in the fall has already been linked to extreme weather patterns all over the country. To add insult to injury, fossil fuel development in the Arctic Ocean would release as much carbon dioxide into our atmosphere as will be released by all modes of U.S. transportation during the next nine years.

We, the undersigned, ask that you and our elected representatives in Washington, DC, support the protection of America's Arctic Ocean by stopping oil and gas development. Preserving these sensitive and vital waters from exploration and exploitation is in our national interest, for today and future generations.

Sincerely,

100 Grannies for a Livable Future
Barbara Schlachter, Convener
Iowa City, IA

ActiveUs
Iowa State University
Rivka Fidel, Contact
Ames, IA

Allamakee County Protectors - Education Campaign
Ric Zarwell, President
Lansing, IA

Blue Water Ventures, LLC
David Thoreson, President
Arnolds Park, IA

Citizens Climate Lobby
Ames, Iowa Chapter,
Erwin Klaas, Contact
Ames, IA

Citizens Climate Lobby
Des Moines Chapter
Gregary Franck, Contact
Des Moines, IA

Citizens Climate Lobby
Iowa City Chapter
Barbara Schlachter, Contact
Iowa City, IA

Drake Environmental Action League
Shereen Hunitie, President
Des Moines, IA

Dubuque Audubon Society
Wayne Buchholtz, President
Dubuque, IA

Environment Iowa
Margie Alt, Executive Director
Des Moines, IA

First Unitarian Church of Des Moines
On behalf of Energy and Justice for All
Jon McAlister, Contact
Des Moines, IA

Iowa Audubon
Douglas C. Harr
President and Chief Operating Office
Ogden, IA

Iowa Environmental Council
Ralph Rosenberg, Executive Director
Des Moines, IA

Iowa Interfaith Power & Light
Rev. Susan Guy, Executive Director
Des Moines, IA

Iowa Wildlife Federation
Rich Leopold, President
Des Moines, IA

Loess Hills Audubon Society
Robert Livermore, President
Sioux City, IA

Methodist Federation for Social Action
Iowa Chapter (MFSA Iowa)
Eloise Cranke, Coordinator

Prairie Rapids Audubon Society
Tom Schilke, President
Waterloo, IA

Professor David Courard-Hauri
Des Moines, IA

Quad City Audubon Society
Dick Sayles, President
Davenport, IA

Rob Hogg
Iowa State Senate
Cedar Rapids, IA

Sierra Club - Iowa Chapter / National Sierra Club
Neila Seaman, Director
Dan Ritzman, National Arctic Policy Director
Des Moines, IA

Tallgrass Prairie Audubon Society
Russell Tabbert, Vice-president
Grinnell, IA

Unitarian-Universalist Fellowship of Ames
Climate Action Team
Erwin Klaas, Contact
Ames, IA

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0140
Comment from Leah Donahey, Alaska Wilderness League

Submitter Information

Name: Leah Donahey
Address:
Alaska Wilderness League
122 C Street NW, Ste. 240
Washington, DC, 20001
Email: leah@alaskawild.org
Organization: Alaska Wilderness League

General Comment

The Honorable Sally Jewell
Secretary of the Interior
Department of the Interior
1849 C Street, NW
Washington DC 20240

Dear Secretary Jewell,

I am writing on behalf of Alaska Wilderness League members who wanted to submit comments on the second draft supplemental Environmental Impact Statement for Chukchi Lease Sale 193 from your agency.

This draft report highlights the risks of drilling in Americas Arctic Ocean, showing that leasing there could be catastrophic with a 75 percent chance that one or more large oil spills (more than 1,000 barrels, or 42,000 gallons, of oil) would occur if the leases are developed.

The Department of the Interior should not continue to push failed policies from the past, instead, the agency should chart a new way forward for the Arctic Ocean that is consistent with the Obama administrations commitment to science, planning and transparency. We urge you to make a decision for the Arctic Ocean that ensures protection of the marine ecosystem and opportunities for subsistence.

Here is the letter that our members signed for your consideration when deciding next steps on Lease Sale 193:

Dear Secretary Jewell,

With the extreme risk of oil spills, it would be reckless to proceed with oil drilling activity in America's Arctic Ocean. Please do not proceed with Lease Sale 193 in this already threatened region.

Included in the attached files are 20,602 comments and signatures.

Thanks for your efforts to ensure that the public has an opportunity to comment on leasing and drilling decisions in the Arctic Ocean.

Sincerely,

Leah Donahey
Arctic Ocean Campaign Director
Alaska Wilderness League

Attachments

LS193comments

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Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0235
Comment from Tim Woody, The Wilderness Society

Submitter Information

Name: Tim Woody
Address:
705 Christensen
Anchorage, AK, 99501
Email: tim_woody@tws.org
Phone: 907-223-2443
Organization: The Wilderness Society

General Comment

To the Bureau of Ocean Energy Management,

This is the third in a series of three submissions of more than 10,500 comments from members and supporters of The Wilderness Society on the Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, OCS Oil and Gas Lease Sale 193 (Lease Sale 193).

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

A major spill would be disastrous for the polar bears, bowhead whales, fish, walruses and other species that live in this fragile marine environment. For the Alaska Native villages along the Arctic Ocean coast, such a spill would be devastating. The sensitive federal lands along the coast also would be greatly harmed if they were oiled.

Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in

the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

Tim Woody
Alaska communications manager
The Wilderness Society

Attachments

Attachment 21 TWS comments

Attachment 22 TWS comments

Attachment 23 TWS comments

Attachment 24 TWS comments

Attachment 25 TWS comments

Attachment 26 TWS comments

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Mrs. Barbara Novovitch
906 N 10th St
Alpine, TX 79830-2312

Dec 12, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

A major spill would be disastrous for the polar bears, bowhead whales, fish, walruses and other species that live in this fragile marine environment. For the Alaska Native villages along the Arctic Ocean coast, such a spill would be devastating. The sensitive federal lands along the coast also would be greatly harmed if they were oiled.

Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

Sincerely,
Mrs. Barbara Novovitch

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Mr. thomas aldridge
296 S 13th St
San Jose, CA 95112-2143

Dec 12, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

BOEM SHOULD TAKE A MATHEMATICS CLASS. BOEM SHOULD TAKE AN ETHICS CLASS AND A MORALITY CLASS. HAS BOEM LOST LOST ITS MIND OR IS IT SIMPLY IN BED WITH THE OIL AND GAS BARONS WHO ARE DETERMINED TO DESTROY THE CLIMATE OF THIS PL;ANET??? IT SEEMS THAT SHELL AND THE OTHER OIL AND GAS BARONS WILL DESTROY THE ARCTIC AND ;;MANKIND IN ITS EFFORT TO INCREASE THEIR BOTTOM LINE. THERE SHOULD BE A SPECIAL PLACE IN HELL FOR THESE VILLAINS WHO MAKE DARTH VADER LOOK LIKE A CHOIR BOY.As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

A major spill would be disastrous for the polar bears, bowhead whales, fish, walruses and other species that live in this fragile marine environment. For the Alaska Native villages along the Arctic Ocean coast, such a spill would be devastating. The sensitive federal lands along the coast also would be greatly harmed if they were oiled.

Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

Sincerely,
Mr. thomas aldridge

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Mrs. Carol Thompson
2874 Amy Dr
South Park, PA 15129-8955

Dec 12, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

A major spill would be disastrous for the polar bears, bowhead whales, fish, walruses and other species that live in this fragile marine environment. For the Alaska Native villages along the Arctic Ocean coast, such a spill would be devastating. The sensitive federal lands along the coast also would be greatly harmed if they were oiled.

Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

Sincerely,
Mrs. Carol Thompson

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Ms. Sheryl Brezina
128 Ashvale Dr
San Dimas, CA 91773-1113

Dec 12, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed. Judging by past experience, I would estimate 100% chance of a spill.

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

A major spill would be disastrous for the polar bears, bowhead whales, fish, walruses and other species that live in this fragile marine environment. For the Alaska Native villages along the Arctic Ocean coast, such a spill would be devastating. The sensitive federal lands along the coast also would be greatly harmed if they were oiled.

Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

Sincerely,
Ms. Sheryl Brezina

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Ms. Grace Neff
800 28th Ave SE
Albany, OR 97322-4177
(541) 928-8508

Dec 12, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

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Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

This would be a disaster waiting to happen and those responsible for letting it happen should suffer dire consequences.

Sincerely,
Ms. Grace Neff

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Ms. Karen Naiman
PO Box 221564
Denver, CO 80222-1015

Dec 12, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

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Sincerely,
Ms. Karen Naiman

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Ms. Shirley Powell
W5356 Schiferl Ln
Johnson Creek, WI 53038-9730

Dec 12, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

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Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

Please help protect this fragile environment. A spill here would be a disaster for the animals that live here. I have seen reports of too many spills that have not been cleaned up in warm areas. A cleanup in an area under ice for half the year would be impossible.

Sincerely,
Ms. Shirley Powell

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Ms. Ellie Thorpe
1953 Navarre rd
gulf breeze, FL 32561-4416

Dec 16, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

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Sincerely,
Ms. Ellie Thorpe

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Ms. Samantha Hechtman
504 S Saint Patrick St
New Orleans, LA 70119-6635

Dec 16, 2014

BOEM

Subject: Please Do not allow Lease Sale 193

Dear BOEM,

Please do not do this. The artic is suffering enough from our dependence on fossil fuels. Please Do NOT make one of the free and wild places on earth differ anymore from our selfishness and short sightedness. We need to be focussing on and investing in tangible renewal energy so that places like the artic can remain wild and begin to recover from all the damage already done. Please do not let this special place be harmed anymore.

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

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Sincerely,
Ms. Samantha Hechtman

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Mr. Chas. Colburn
3601 Summer Rd
Suitland, MD 20746-3014

Dec 17, 2014

BOEM

Subject: Lease Sale 193 must be stopped

Dear BOEM,

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

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Sincerely,
Mr. Chas. Colburn

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Ms. kari killoran
519 E Main St
Middleburg, PA 17842-1217
(570) 541-9370

Dec 17, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

A major spill would be disastrous for the polar bears, bowhead whales, fish, walruses and other species that live in this fragile marine environment. For the Alaska Native villages along the Arctic Ocean coast, such a spill would be devastating. The sensitive federal lands along the coast also would be greatly harmed if they were oiled.

Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

The animals in this area have just as much of a right to thrive and be healthy as we do. It saddens me to see greed and politics destroying our wilderness and running innocent animals into extinction. This decision shouldn't be about what benefits the oil industry, or what makes the most money. It should be about what is right for this planet and everything in it, and a sustainable future for all. Please use the time and effort to continue looking into renewable energy.

Thank you for your time.

Sincerely,
Ms. kari killoran

Representative of 2 Submittals from Alaska Wilderness Society | Document too voluminous to include in SEIS | All documents reviewed and considered

Ms. Annette Howell
8801 Eton Ave Spc 13
Canoga Park, CA 91304-0856

Dec 19, 2014

BOEM

Subject: 75% chance of a spill? Lease Sale 193 must be stopped

Dear BOEM,

As ordered by the U.S. 9th Circuit Court of Appeals, the Bureau of Ocean Energy Management recently issued a revised draft supplemental environmental impact statement for Lease Sale 193 in Alaska's Chukchi Sea, estimating a 75 percent chance of a large oil spill if this tract is developed.

Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, BOEM should select Alternative II which would vacate the Chukchi Sea lease sale.

A major spill would be disastrous for the polar bears, bowhead whales, fish, walruses and other species that live in this fragile marine environment. For the Alaska Native villages along the Arctic Ocean coast, such a spill would be devastating. The sensitive federal lands along the coast also would be greatly harmed if they were oiled.

Such a high level of risk is unacceptable for America's Arctic. The oil industry has no ability to recover meaningful amounts of oil from these remote, icy and stormy seas. Lease Sale 193 is obviously a disaster in the making. I urge you to halt all plans for drilling in the Arctic Ocean's Chukchi Sea.

This planet is the only home we have - it's time to stop trashing it thinking there will be no consequence. We all have to live here and care for this place we call earth. One spill would permanently devastate this ocean and all of the wildlife that lives there. We have to stop imposing these threats to those who have absolutely no ability to do anything about it. The wildlife have nowhere to escape the poisoning of the waters. The spill in the gulf has never been addressed as it should be and nobody wants to deal with the bathtub ring left there and that is in a warmer climate. You KNOW if another spill happens that again it will be left in ruins because the oil industry is not interested or capable of using their profits to fix the problems because they don't care. It's all about money and no amount of money can replace all the damage that would be done.

Please don't allow this to happen. Please do the right thing for all of 'us'. Thank you for your time and consideration.

Sincerely,
Ms. Annette Howell

PUBLIC SUBMISSION

As of: December 22, 2014
Received: December 22, 2014
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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0222
Comment from Josh Nelson, CREDO Action

Submitter Information

Name: Josh Nelson
Address:
101 Market St
STE 700
San Francisco, CA, 94105
Email: jnelson@credoaction.com
Phone: 415.369.2000
Organization: CREDO Action

General Comment

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Enclosed are 75,333 individual public comments collected by CREDO Action for submission to the Gas Lease Sale 193 environmental impact statement docket. Individual comments may differ throughout, although the majority read as follows:

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate and would likely lead to an oil spill that would be nearly impossible to clean up. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling.

The comments have been split into 19 documents in order to facilitate uploading to the Regulations.gov website.

Please contact me if you have any questions about the attached comment submissions.

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Sincerely,

Josh Nelson
Campaign Manager, CREDO Action
jnelson@credoaction.com
415-369-2000

Attachments

CREDO_Shell_drilling_comments_part2

CREDO_Shell_drilling_comments_part3

CREDO_Shell_drilling_comments_part1

CREDO_Shell_drilling_comments_part6

CREDO_Shell_drilling_comments_part5

CREDO_Shell_drilling_comments_part4

CREDO_Shell_drilling_comments_part8

CREDO_Shell_drilling_comments_part7

CREDO_Shell_drilling_comments_part9

CREDO_Shell_drilling_comments_part12

CREDO_Shell_drilling_comments_part11

CREDO_Shell_drilling_comments_part10

CREDO_Shell_drilling_comments_part13

CREDO_Shell_drilling_comments_part14

CREDO_Shell_drilling_comments_part17

CREDO_Shell_drilling_comments_part15

CREDO_Shell_drilling_comments_part16

CREDO_Shell_drilling_comments_part18

CREDO_Shell_drilling_comments_part19

file:///S|/...Projects/EIS/LS193_2014/FinalSecondSEIS/SupportDocuments/Swears/FDMSExports/Credo-0222/BOEM-2014-0078-0222.html[12/22/2014 9:00:18 PM]

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate and would likely lead to an oil spill that would be nearly impossible to clean up. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling.

Sincerely,

Jordan Krueger
1416 Willow St., Rear
Alameda, CA 94501-2769

CREDO Action

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

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Sincerely,

Guy Vanderschelden
St-Gabrielstraat 61
Sherborn, MA 01770

CREDO Action

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

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Sincerely,

Ruth Honor
3 Friend St
Salem, MA 01970-2201

CREDO Action

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate and would likely lead to an oil spill that would be nearly impossible to clean up. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling.

Sincerely,

karen stickney
27 baril street
Lewiston, ME 04240-5213

CREDO Action

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate and would likely lead to an oil spill that would be nearly impossible to clean up. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling.

Sincerely,

Rev Charles Grindle
12 Day
Kennebunk, ME 04043-7193

CREDO Action

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate and would likely lead to an oil spill that would be nearly impossible to clean up. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling.

Sincerely,

Rang Ma
Westminster West Rd
Putney, VT 05346

CREDO Action

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate and would likely lead to an oil spill that would be nearly impossible to clean up. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling.

Sincerely,

Dro Green
49 Robbins St
Lowell, MA 01851-3019

CREDO Action

Representative of CREDO Action Submittal | Document to voluminous to include in SEIS | All comments were reviewed and considered

Bureau of Ocean Energy Management (BOEM)

ATTN: Docket ID No. BOEM-2014-0078, Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate and would likely lead to an oil spill that would be nearly impossible to clean up. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling.

Sincerely,

Kenneth Strange
11033 N. Skiles Ave
Kansas City, MO 64157-8634

CREDO Action

PUBLIC SUBMISSION

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0274
Comment from Erik Grafe, Earthjustice, et al.

Submitter Information

Name: Erik Grafe
Address:
Earthjustice
441 W 5th Avenue, Suite 301
Anchorage, AK, 99501
Email: egrafe@earthjustice.org
Organization: Earthjustice, et al.

General Comment

Attached are comments submitted on behalf of Alaska Wilderness League, et al., on the second supplemental draft environmental impact statement for Chukchi Lease Sale 193. Attachments in support of these comments will be provided under separate submission.

Thank you.

Attachments

Alaska Wilderness League et al, Lease Sale 193 SSEIS Comments, 12-22-14

ALASKA WILDERNESS LEAGUE—CENTER FOR BIOLOGICAL DIVERSITY
EARTHJUSTICE—FRIENDS OF THE EARTH—GREENPEACE
NATURAL RESOURCES DEFENSE COUNCIL
NORTHERN ALASKA ENVIRONMENTAL CENTER
OCEAN CONSERVATION RESEARCH—PACIFIC ENVIRONMENT
REDOIL—SIERRA CLUB—THE OCEAN FOUNDATION
THE WILDERNESS SOCIETY—WORLD WILDLIFE FUND

December 22, 2014

VIA FEDERAL RULEMAKING PORTAL

Walter D. Cruickshank
Acting Director, Bureau of Ocean Energy Management
1849 C Street, NW
Washington, DC 20240

Re: Comments on Second Supplemental Environmental Impact Statement for Chukchi Sea Oil and Gas Lease Sale 193, BOEM-2014-0078

Dear Director Cruickshank:

The undersigned groups hereby submit the following comments on the draft second supplemental environmental impact statement for Chukchi Sea Lease Sale 193 (Draft EIS) prepared by the Bureau of Ocean Energy Management (BOEM) pursuant to the National Environmental Policy Act (NEPA) and the Ninth Circuit Court of Appeals January, 2014, decision holding unlawful BOEM's prior environmental analysis and decision to hold Lease Sale 193.

The reconsideration of the Lease Sale 193 decision is an important opportunity for the Administration to correct its approach to the Arctic Ocean by recognizing and protecting the region's irreplaceable wildlife, ecological richness, and cultural significance. When it originally was held by the previous administration, Lease Sale 193 was a central component of the rush to open the rapidly changing Arctic Ocean to oil drilling. The intervening years, and particularly Shell Oil's failed attempts in 2012 to drill for oil in the Beaufort and Chukchi seas, have demonstrated the dangers of opening the area to oil drilling. Various federal agencies now have completed their investigations into Shell Oil's 2012 operations. The results of these investigations demonstrate conclusively that companies are not prepared to conduct offshore drilling in the Arctic Ocean responsibly. Most recently, Noble Drilling, the operator of the drilling vessels Shell used in its drilling campaign, pled guilty to having committed eight felonies in connection with those operations. Noble's crimes included discharging oily water into the ocean and concealing multiple engine and safety equipment failures, even as the industry was providing assurances that it fully was ready to mobilize and drill safely in the Arctic Ocean.

The reconsideration of the lease sale decision is also an opportunity to exercise leadership in addressing climate change going into next year's Paris climate summit. Drilling for oil in the Arctic Ocean is incompatible with this Administration's commitment to address climate change comprehensively. There is international scientific consensus recognized by the President that the vast majority of fossil fuel reserves must be left undeveloped and in the ground if we are to avoid the worst effects of climate change. Opening new, unproven reserves, such as Arctic Ocean oil, much less existing reserves that already should be kept undeveloped undermines the Administration's strong efforts elsewhere to rein in carbon emissions.

As described below, the Draft EIS largely ignores this context and does not meaningfully inform the decision the Secretary of the Interior is charged with making here: whether, where, and under what conditions to offer oil and gas leases in the Chukchi Sea. Instead, the document was produced in great haste in service of completing the reconsideration of the lease sale decision by the summer of 2015 so that, should the Secretary decide to affirm the leases, Shell Oil, one of the companies that acquired leases in the original sale, potentially could drill on the leases this coming summer. Not surprisingly given the rushed timeframe, the document is deeply flawed. It acknowledges that the effects of the lease sale could be much worse than disclosed in the original environmental impact analysis, but it does not provide the Secretary with any new choices or approaches to respond to these new disclosures. It fails to analyze the climate consequences of developing oil and gas in the Chukchi Sea. It continues to rely on outdated oil spill analyses. It fails to take a hard look at the potential effects of oil and gas activities on the Chukchi Sea's sensitive species. It fails meaningfully to incorporate new information about the risks of Arctic drilling in light of Shell Oil's bungled efforts to operate in the Arctic in 2012. BOEM will have to undertake substantial revisions of the Draft EIS to produce an adequate analysis of effects to inform this decision and meet NEPA's requirements.

I. The Draft EIS discloses that the potential effects of the lease sale are much greater than described in the original EIS, but it does not provide the Secretary with sufficient analysis to address these larger impacts in her lease sale decision

BOEM has completed the Draft EIS in response to a Ninth Circuit Court remand of the lease sale decision that compels the agency to reconsider its decision to offer oil and gas leases in the Chukchi Sea. The Court determined that BOEM unlawfully analyzed "only the *best* case scenario for environmental harm" in the environmental impact statement for the lease sale, seriously undermining the decision.[1] BOEM's errors fundamentally undermined its analysis and disclosure of the lease sale's potential effects. As the Court explained, BOEM chose "the lowest possible amount of oil that was economical to produce[, one billion barrels of oil,] as the basis for its analysis."[2] "The one billion barrel estimate was the basis for the entire [environmental impact statement], including its analysis of the risk of a large oil spill . . . an assessment of seismic effects, habitat effects, oil production, and the cumulative effects of the sale on global warming . . . [and the Fish and Wildlife Service's] determination that Lease Sale 193 would not jeopardize listed species."[3] The decision to offer leases in the Chukchi Sea thus was based on a basic misunderstanding of the potential effects of the decision.

[1] *Native Vill. of Point Hope v. Jewell*, 740 F.3d 489, 504 (9th Cir. 2014).
[2] *Id.* at 502.
[3] *Id.* at 501, 504.

BOEM in the Draft EIS now has revised its projection of the potential effects of offering oil and gas leases in the Chukchi Sea. It now projects that four times more oil could be produced from the lease sale than it acknowledged in the original EIS.[4] Exploration, development, and production of this larger amount of oil would require more wells, drilling rigs, platforms, vessels, and aircraft than previously disclosed, with commensurately greater impacts. The Draft EIS now admits the lease sale could result in major impacts to fish, birds, marine mammals, and subsistence.[5] It acknowledges that there is now a 75 percent chance of one or more large oil spills should the lease sale lead to oil development.[6]

Based on the more realistic scenario, the Draft EIS describes Chukchi Sea oil and gas activities that differ fundamentally from those disclosed in the agency's earlier EISs. Yet BOEM does not assess whether this new, bigger level of impact and risk warrants new approaches to the lease sale. For example, the agency has elsewhere embraced an approach in the Arctic Ocean of "targeted leasing" that seeks to identify smaller areas to offer for lease that minimize conflict between the impacts of developing hydrocarbon resources and protecting the ecology of the region.[7] The EIS makes no attempt to employ this approach here. Nor does it assess whether leases should have different stipulations and mitigation measures to better mitigate the larger potential effects. Instead, the document acknowledges the larger effects and risks and forges ahead with the same analyses, including for example the same alternatives, as were described in the 2007 EIS and the 2011 supplemental EIS. This approach results in a document that does not foster meaningful reconsideration of the lease sale in light of the new information the agency has developed. Having now acknowledged dramatically different impacts than previously disclosed, BOEM must prepare an EIS that offers the Secretary analyses responsive to this new information and options for her to address it.

II. The Draft EIS improperly bases its analysis on the existing Chukchi Sea leases issued pursuant to the unlawful lease sale that the Secretary must reconsider

A fundamental tenet of NEPA is that "[e]nvironmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made."[8] Thus, in situations such as the one here—in which a court holds an agency decision unlawful and remands but does not vacate the decision—the government is required to ensure during the remand that the prior "decision based on a legally

[4] Draft EIS at 26.
[5] Draft EIS at 37-38.
[6] Draft EIS at 154.
[7] *See* BOEM, Proposed Final Outer Continental Shelf Oil & Gas Leasing Program 2012-2017 (June 2012), at 6-12 (2012-2017 OCS Leasing Program); 78 Fed. Reg. 59, 715, 59,716 (Sept. 27, 2013) (call for nominations for Chukchi Sea lease sale 237); National Audubon Society, et al., Comments on Call for Information and Nominations, Proposed Chukchi Sea Lease Sale 237 (Dec. 3, 2013), *available at* http://www.regulations.gov/#!documentDetail;D=BOEM-2013-0015-0028.
[8] 40 C.F.R. § 1502.2(g); *see also Metcalf v. Daley*, 214 F.3d 1135, 1143-46 (9th Cir. 2000) (backfilling environmental review once "the die already ha[s] been cast" violates NEPA); Pit River Tribe v. U.S. Forest Serv., 469 F.3d 768, 785-87 (9th Cir. 2006) (same).

insufficient EIS counts for nothing."[9] Only in this manner can the government avoid bureaucratic momentum and rationalization of the prior decision to offer leases in the Chukchi Sea that the agency is charged with considering anew during the remand.

BOEM has violated this principle here. Its analysis in the Draft EIS of the lease sale's potential impacts and alternatives is based entirely on the existence of the unlawfully issued leases. BOEM explains in the Draft EIS that it has formulated the scenario on which it bases its analysis of effects on an assumption "that current lessees will explore their leases, successfully discover an anchor field as well as a satellite field, develop necessary infrastructure, and produce . . . oil and . . . natural gas from the leases issued in Lease Sale 193."[10] It states, "the unique circumstances of the Lease Sale 193 Draft Second SEIS—prepared after Lease Sale 193 has been held—enables BOEM to create a more focused exploration, development, production, and decommissioning scenario than is normally possible."[11] It has "projected potential development based upon the post-sale analysis of tracts that received bids."[12] The entire environmental effects and alternatives analyses in the Draft EIS are "predicated" on this "post-sale" scenario.[13]

BOEM's approach is unresponsive to the court's remand. The remand requires the agency to conduct a rational assessment of the potential environmental effects of and alternatives for offering oil leases in the Chukchi Sea and, based on that analysis, for the Secretary to make anew the decision whether to offer those leases. In other words, BOEM's job on remand is to provide an analysis that allows the Secretary to consider, based on a realistic assessment of potential effects of a reasonable range of alternatives, "whether and in what manner to pursue the lease sale" and "which parcels to offer for lease."[14] Instead, by basing its analysis on the existing leases resulting from the lease sale now under reconsideration, BOEM has conducted in the Draft EIS an analysis of the potential effects of the lease sale *that was held in 2008*. Basing the EIS on an after-the-fact analysis of the effects of the unlawful decision already made undermines the central NEPA principle that the effects of a decision must be analyzed in an EIS *before* the decision is made.

For example, basing the assessment of resources for the scenario on the specific results of Lease Sale 193, as described above, may well have resulted in a lower resource estimate than a pre-lease sale approach, particularly where, as here, the sale covered a very large area comprising much of the planning area. In a pre-lease sale scenario, BOEM would have tied its scenario to information about the economically recoverable resource potential of the entire

[9] *N. Cheyenne Tribe v. Hodel*, 851 F.2d 1152, 1157 (9th Cir. 1988).
[10] Draft EIS at 149.
[11] *Id.* at 20.
[12] *Id.* at 24. The scenario apparently is based on very specific data from "all 487 tracts receiving bids in the sale" which allowed BOEM to identify specific prospects underlying these tracts and assess their "geologic and reservoir properties" and likelihood of development. *Id.* at B-2. From this information, BOEM determined that two of the prospects have the potential to be anchor fields and characterized thirteen as potential satellite fields that would only be developed if an initial anchor field was developed first. *Id.* at B-3.
[13] *Id.* at 149.
[14] *Native Vill. of Point Hope v. Jewell*, 740 F.3d at 504.

leasing area, which it states is 11.5 Bbbl of oil at a price of $110 per barrel.[15] As it has in the past, it would have analyzed a range of scenarios based on a range of resource estimates (e.g., a base, low, and high case) or chosen a representative resource amount reasonably tied to the potential for the area (e.g., a mid-point of 5.75 Bbbl). Here, however, it focused on only those prospects actually leased in the sale. As a result, its resource estimate was much more constrained, which led to a 4.3 Bbbls of oil scenario. That the lease-focused approach limited the scenario is evidenced also by the fact that in this Draft EIS, the cumulative case scenario is based on 6.4 billion barrels of oil, in part because it covers areas outside of those actually leased in the lease sale. A lower resource estimate, of course, leads to a lower projection of activities and skews the impact and risk analysis downward. Thus, BOEM's reliance on the post-lease analysis to formulate the scenario may improperly have limited the scenario and minimized potential effects.

The reliance on post-lease sale information also affects BOEM's analysis of an oil spill. In that analysis, BOEM has reduced the potential launch sites for a large oil spill to only those areas in which there are existing leases.[16] This affects the entire oil spill trajectory analysis and disclosure of the risks to important resource areas, limiting the information only to the areas already leased.

The decision whether to hold Lease Sale 193 is a decision about whether to open the Chukchi Sea, where there were no active oil leases prior to the sale, to potential long-term, large-scale offshore oil drilling. BOEM's post-lease sale-focused scenario is narrower, and by potentially down-sizing and localizing effects, it fails to provide an adequate basis upon which the Secretary can make this broad decision.

III. BOEM unlawfully has failed to assess the potential climate change effects of the combustion of oil and gas produced as a result of the lease sale

As this Administration has recognized elsewhere, climate change is the defining issue of our time. Yet BOEM, in preparing a document meant to inform a major energy decision, whether to open the Chukchi Sea to fossil fuel leasing, fails to address the full climate consequences of the decision because it does not address the climate consequences of burning the oil and gas that could be produced as a result of the lease sale. In its 2007 EIS, the agency dismissed the greenhouse gas emissions from combustion of oil that could be produced as a result of Lease Sale 193 in a couple of sentences, stating that the large increase in supply resulting from the lease sale "likely would not change" aggregate oil consumption or change, therefore, greenhouse gas emissions from oil consumption.[17] In the 2011 supplemental EIS, the agency took a different course and said that NEPA did not require it to estimate the contribution to climate change from burning the oil and gas produced by the lease sale and that uncertainty and a lack of reliable methodologies prevented it from making an estimate.[18] In the Draft EIS here, BOEM simply has omitted any mention at all of the climate consequences of burning oil and gas produced as a consequence of the lease sale. BOEM adopted a development and

[15] Draft EIS at 20-21.
[16] Draft EIS at A-71.
[17] Lease Sale 193 EIS, OCS EIS/EA MMS 2007-026 (May 2007) at IV-16.
[18] Lease Sale 193 Revised Supplemental EIS, OCS EIS/EA BOEMRE 2010-034 (May 2011) at 19.

production scenario of 4.3 billion barrels of oil and 2.2 Tcf of gas as reasonably foreseeable for analysis of environmental impacts and of economic benefits, but it has failed to use the scenario to analyze the effects of emissions resulting from combustion of the forecast oil and gas. This omission violates NEPA and ignores an important component of the Administration's decision whether to open the Chukchi Sea to carbon-intensive fossil energy development.

BOEM must consider the effects of the combustion of oil and gas from the lease sale. Contrary to BOEM's unsupported assertion in the 2007 EIS, increasing the supply of oil can result in increased carbon emissions. A recent academic article concluded in the context of the Keystone XL project that increasing oil supplies can lower the price of oil, changing consumption levels and thereby increasing global carbon emissions.[19] Contrary to its 2011 EIS assertions, greenhouse gas emissions from combustion of oil and gas are an indirect effect of this lease sale. "Council on Environmental Quality regulations define indirect effects as those 'caused by the action, [and] later in time or further removed in distance, [but] still reasonably foreseeable.'"[20] "An agency must consider them."[21] NEPA requires analysis of greenhouse gas emissions from the combustion of oil and gas produced through the lease sale because they are reasonably foreseeable and caused by this lease sale. Indeed, the combustion of a significant portion of the oil and gas BOEM forecasts could be produced as a result of the lease sale is the lease sale's objective. For the same reason, NEPA also requires that BOEM analyze, as cumulative effects, the contribution of these emissions to global climate change in combination with "other past, present, and reasonably foreseeable future actions."[22] As the Ninth Circuit decision remanding the lease sale reaffirmed: "Under NEPA, BOEM is required to take into account the full environmental effects of its actions when deciding whether and in what manner to pursue the lease sale. . . . It is only at the lease sale stage that the agency can adequately consider cumulative effects of the lease sale on the environment, including . . . the effects of the sale on climate change."[23] The Council on Environmental Quality recently reiterated that "NEPA and its implementing regulations . . . require federal agencies to evaluate the reasonably foreseeable environmental impacts of their actions, including foreseeable [greenhouse gas] and climate change implications."[24] The agency's consideration of climate change "must be more than perfunctory; it must provide a useful analysis of the cumulative impacts."[25] The Council on

[19] Peter Erickson & Michael Lazarus, Impact of the Keystone XL pipeline on global oil markets and greenhouse gas emissions, Nature Climate Change (Aug. 10, 2014). This document and others referred to in this letter are attached separately. BOEM must consider these documents and include them in the administrative record for the decision.
[20] *S. Fork Band Council of W. Shoshone of Nevada v. U.S. Dept. of Interior*, 588 F.3d 718, 725 (9th Cir. 2009) (quoting 40 C.F.R. § 1508.8(b)) (alterations in original).
[21] *Id.*
[22] *See Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 993 (9th Cir. 2004) (quoting 40 C.F.R. 1508.7). *Ctr. for Biological Diversity v.* ___, 538 F.3d ___, 1217 (9th Cir. ___) ("The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct.").
[23] *Native Village of Point Hope v. Jewell*, 740 F.3d 489, 504 (9th Cir. 2014).
[24] Council on Environmental Quality (CEQ), Letter to Joseph Mendelson, III, et al., Re. CEQ's Response to a Petition for Rulemaking and Issuance of Guidance to Require Inclusion of Climate Change Analyses in NEPA Documents (Aug. 7, 2014).
[25] *See Klamath-Siskiyou Wildlands*, 387 F.3d at 994 (quoting *Ocean Advocates v. U.S. Army Corps of Eng'rs,* 361 F.3d 1108, 1128 (9th Cir. 2004)).

Environmental Quality has also recently published draft guidance to provide agencies direction on how to consider the effects of greenhouse gas emissions and climate change in the evaluation of their decisions under NEPA.[26] The guidance instructs agencies that "[e]missions from activities that have a reasonably close causal relationship to the federal action, such as those that may occur . . . as a consequence of the agency action (often referred to as downstream emissions) should be accounted for in the NEPA analysis."[27] It notes there are "widely available tools [that] address GHG emissions, including emissions from fossil fuel combustion and other activities."[28]

Also contrary to the agency's assertion in the 2011 EIS, methods for determining the climate consequences of the end use of fossil fuels exist and are in common use. Other agencies analyzing fossil fuel decisions have employed various methodologies to estimate how their actions will contribute to overall fossil fuel consumption and increased greenhouse gas emissions. The environmental impact statements for the decisions employ modes of economic analysis that BOEM may be able to use to model the effect of Lease Sale 193 on aggregate oil and gas consumption.[29] The Department of State has employed economic modeling to estimate the Keystone XL Pipeline project's impact on oil consumption and net greenhouse gas emissions.[30] Indeed, highlighting the importance of climate change impacts to the decision, President Obama has rightly said he will only approve the project if it "does not significantly exacerbate the problem of carbon pollution."[31] Likewise, the Environmental Protection Agency and the National Highway Traffic Safety Administration modeled the impact on world oil markets of their Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards.[32] In addition, BOEM's own earlier EIS for this lease sale suggests that BOEM in the past has used methodologies that would allow it to estimate the effect of these new supplies on oil consumption and thus their effects on global warming. The agency in the 2007 EIS cites a study it prepared that predicts that each barrel of oil produced from the outer continental shelf will reduce conservation, fuel switching, and imports, and estimates the magnitude of those impacts per 100 barrels produced.[33] BOEM should identify and use suitable methods to estimate and disclose the potential greenhouse gas

[26] CEQ, Fact Sheet: Guidance on Considering Climate Change in NEPA Reviews and Conducting Programmatic NEPA Reviews (Dec. 18, 2014); CEQ, Revised Draft Guidance on Consideration of Greenhouse Gas Emissions and Climate Change in National Environmental Policy Act Evaluations (Dec. 2014) (CEQ Revised Draft Guidance)
[27] CEQ Revised Draft Guidance at 11.
[28] *Id.* at 15.
[29] Plaintiffs provided these studies to illustrate that relevant methodologies exist, not to endorse their modeling or conclusions.
[30] *See, e.g.*, U.S. Dep't of State. Final Supplemental EIS for the Keystone XL Project (Jan. 2014), at 1.4.4 (describing model) and 4.14 (climate change assessment) (Keystone XL Project FSEIS), available at http://keystonepipeline-xl.state.gov/finalseis/index.htm..
[31] The White House, Remarks by the President on Climate Change, Georgetown Univ. (June 25, 2013), www.wgitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change.
[32] U.S. Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration, Draft Joint Technical Support Document Proposed Rulemaking to Establish Light- Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards (Sept. 2009)
[33] 2007 EIS at IV-24 (summarizing the conclusions of BOEM's internal analysis in *Energy Alternatives and the Environment* (2001)); Minerals Management Service, *Energy Alternatives and the Environment*, OCS Report MMS 2001-096 (Nov. 2001).

consequences of developing and consuming offshore oil and gas from the Chukchi Sea as a result of the lease sale.

Since BOEM completed the first supplemental EIS, new information has been developed that underscores the importance of examining the climate change consequences of the combustion of oil and gas from the lease sale. Significantly, there is now widespread recognition, including by the world's leading body of climate scientists, the Intergovernmental Panel on Climate Change, that fossil fuel resources must remain undeveloped for us to have a reasonable chance of meeting internationally agreed upon benchmarks for limiting climate change.

In fall 2014, the Intergovernmental Panel on Climate Change published a Fifth Synthesis Report, which provides an integrated view of climate change and addresses observed changes and their causes; future climate change, risks, and impacts; future pathways for adaptation, mitigation, and sustainable development; and adaptation and mitigation.[34] The report concludes that carbon dioxide emissions must be limited to an additional 1000 $GtCO_2$ if we are to have a 66 percent chance of limiting warming to 2 degrees Celsius.[35] It estimates there are about 3670-7100 $GtCO_2$ in fossil fuel reserves, which it describes as quantities of fossil fuels able to be recovered under existing economic and operating conditions.[36] As the report notes, this is 4 to 7 times the amount we can burn to have a 66 percent chance of remaining within the 2 degrees Celsius warming goals established by the international community.[37] Thus, the vast majority of fossil fuel reserves—not to mention fossil fuel like that in the Chukchi Sea that may not yet be in the reserve category because it has not been proven with exploration wells—must be left undeveloped if we are to have even a two-in-three chance of avoiding the worst effects of climate change.[38] The International Energy Agency had earlier made a similar conclusion and warned that "[n]o more than one-third of proven reserves of fossil fuels can be consumed prior to 2050 if the world is to achieve the 2°C goal."[39] Notably, this limit also does not allow for exploitation of any unproven reserves, like those in the Chukchi Sea. The President, as well, has recognized that a necessary component of limiting carbon emissions is ensuring that much of the world's fossil fuel reserves remain underground.[40]

[34] Intergovernmental Panel on Climate Change, Climate Change 2014: Synthesis Report (2014) (IPCC Report), *available at* http://www.ipcc.ch/report/ar5/syr/Intergovernmental.
[35] IPCC report at 66-68.
[36] *Id.* at 68 (Table 2.2 n. f).
[37] *Id.* at 67.
[38] *See also*, Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (2014), at 379-380, *available at* http://mitigation2014.org/report/publication, ("The emissions budget for stabilizing climate change at 2 °C above pre-industrial levels is about the same as the current carbon content of the atmosphere, meaning that under this constraint only a small fraction of reserves can be exploited.").
[39] *See* International Energy Agency, World Energy Outlook 2012, Executive Summary, at 3, *available at* http://www.iea.org/publications/freepublications/publication/English.pdf.
[40] Thomas Friedman, *Obama on Obama on Climate*, New York Times, June 7, 2014, *available at* http://www.nytimes.com/2014/06/08/opinion/sunday/friedman-obama-on-obama-on-climate.html?emc=eta1.

The decision whether to offer oil and gas leases in the Chukchi Sea, and the Arctic Ocean generally, may have large climate consequences. Producing and burning projected technically recoverable oil and gas reserves in the Arctic Ocean has the potential to release 15.8 billion tons of CO_2 (4.31 GtC) into the atmosphere.[41] This is equivalent to the emissions from all forms of transportation in the U.S. over a 9 year time period,[42] or burning 90 years' worth of oil flowing through the Keystone pipeline at maximum capacity.[43] In addition, emissions associated with Arctic Ocean exploration and development would release black carbon directly onto Arctic ice, accelerating sea ice melt, with potentially serious effects in and out of the region.[44]

In light of its NEPA obligations and this new information, BOEM must analyze and disclose fully the climate costs of fossil fuel decisions—it must analyze and disclose the effects of burning oil and gas potentially produced as a result of the lease sale. It also must integrate this analysis into its formulation and comparison of alternatives. Incorporating the climate change consequences of burning Lease Sale 193 oil and gas into the analysis of whether to hold the lease sale also is critical to meeting the Outer Continental Shelf Lands Act mandate of

[41] The U.S. Arctic Ocean has 23.6 billion barrels of technically recoverable oil and 104.41 trillion cubic feet of technically recoverable gas. *See* 2012-2017 OCS Leasing Program at 2, *available at* http://boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Leasing/Five_Year_Program/2012-2017_Five_Year_Program/PFP%2012-17.pdf. One barrel of oil = 0.43 metric tons of CO_2. *See* EPA, Green Power Equivalency Calculator Methodologies, http://www.epa.gov/greenpower/pubs/calcmeth.htm. One cubic foot of gas = 0.0545 kg CO_2. *See* EPA, 2012 Climate Registry Default Emission Factors (Jan. 6, 2012), at 1, *available at* http://www.theclimateregistry.org/downloads/2012/01/2012-Climate-Registry-Default-Emissions-Factors.pdf. Producing and burning all reserves would result in 15.8 billion metric tons CO_2 (10.1 billion from oil and 5.7 billion from gas).
[42] According to the EPA, in 2012 the CO_2 equivalent (CO_2E) for all transportation emissions in the U.S. was 1.74 billion metric tons. *See* EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012, Executive Summary (Apr. 2014), at ES-5, *available at* http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG. Inventory-2014-Chapter-Executive-Summary.pdf. 15.8 billion metric tons of CO_2E divided by 1.74 billion metric tons of CO_2E from all forms of transportation per year equals 9.08 years of CO_2E.
[43] This calculation assumes Keystone can transport 830,000 barrels of tar sands oil per day, *see* U.S. House of Representatives Energy & Commerce Comm., Keystone XL: #TimeToBuild, *available at* http://energycommerce.house.gov/content/keystone-xl, and that the full lifecycle CO_2 emissions of tar sands oil are approximately 1.32 times the emissions for oil with average CO_2 content (0.43 metric tons of CO_2 per barrel, *see* note 3), or approximately 0.568 metric tons of CO_2 per barrel. *See also* U.S. Dep't of State, Draft Supplemental EIS for the Keystone XL Project, Executive Summary (Mar. 2013), at ES-15, *available at* http://keystonepipeline-xl.state.gov/documents/organization/205719.pdf (State Department estimates full cycle emissions per barrel of tar sands are 17 percent greater than average U.S. barrel of oil); Oil Change International, Petroleum Coke: The Coal Hiding in the Tar Sands (Jan. 2013), at 16-17, *available at* http://priceofoil.org/content/uploads/2013/01/OCI.Petcoke.FINALSCREEN.pdf (Oil Change International estimates an additional 13 percent of full cycle emissions per barrel of tar sands oil that State Department analysis misses by not analyzing petcoke by-product lifecycle emissions).
[44] *See, e.g.*, Judah Cohen et al., Warm Arctic, cold continents: A common pattern related to Arctic sea ice melt, snow advance, and extreme winter weather, Oceanography 26(4) (2013), *available at* http://dx.doi.org/10.5670/oceanog.2013.70; James A. Screen, Influence of Arctic sea ice on European summer precipitation, Environmental Research Letters 8(4) (2013), *available at* http://iopscience.iop.org/1748-9326/8/4/044015/.

ensuring "orderly" offshore development "subject to environmental safeguards." 43 U.S.C. § 1332(3).

IV. The Draft EIS's analysis of the climate change impacts of emissions directly from oil and gas operations in the Chukchi Sea is insufficient

The Draft EIS devotes three paragraphs to the discussion of the direct climate change impacts of exploration and production activities resulting from the lease sale.[45] The analysis is woefully inadequate. The agency apparently concludes that no further analysis is necessary on the basis that "given the small percentage contributions of oil and gas activities in the Scenario to global GHG emissions, the potential impact on climate change would likely be small."[46] As the recent Council on Environmental Quality draft guidance makes clear, however:

> Government actions occur incrementally, program by program and step by step, and climate impacts are not attributable to any single action, but are exacerbated by a series of smaller decisions, including decisions made by the government. Therefore, the statement that emissions from a government action or approval represent only a small fraction of global emissions is more a statement about the nature of the climate change challenge, and is not an appropriate basis for deciding whether to consider a climate impact under NEPA. Moreover, these comparisons are not an appropriate method for characterizing the potential impacts associated with a proposed action and its alternatives and mitigation. This approach does not reveal anything beyond the nature of the climate change challenge itself: the fact that diverse individual sources of emissions each make relatively small additions to global atmospheric GHG concentrations that collectively have huge impact.[47]

BOEM has done just what the guidance tells it not to do. NEPA requires better. BOEM must analyze and disclose the effects of these emissions, which are not, in fact, "small" in comparison with emissions analyzed in other EISs.

The Draft EIS's climate change analysis also understates the potential effects of black carbon emissions in the Arctic. The Draft EIS concedes that black carbon "plays a role in short-term climate effects in the Arctic," and these effects "are especially strong in sensitive areas such as the Arctic."[48] But it discounts these contributions to climate change because "the PM emissions from the Scenario would be small relative to global PM emissions; therefore, the contribution of the PM emissions from the Scenario to global climate change would also be small."[49] As described above, this does not constitute analysis. It also underestimates the

[45] Draft EIS at 191-92.
[46] *Id.* at 191.
[47] CEQ Revised Draft Guidance at 9.
[48] Draft EIS at 66.
[49] *Id.* at 191-92.

potential for warming by assuming that black carbon emissions elsewhere have an equally proportionate effect on climate as do black carbon emissions in the Arctic, which is not the case. Rather, black carbon is a regional pollutant, meaning that "emissions sources in Alaska are likely to have an impact on the Arctic."[50] "Emissions north of the 40th parallel are thought to be particularly important for [black carbon's] climate-related effects in the Arctic[.]"[51]

The Draft EIS also avoids discussion of the effects of soot from in-situ burning by considering only "[p]otential contamination of shoreline and onshore vegetation," which it concludes "would be limited because . . . activities under the Proposed Action would be at least 60 miles from shore . . . ."[52] This conclusion is arbitrary for three reasons. First, it omits the potential that in-situ burning would be used on an oil slick that has moved closer to shore. Second, it assumes that sixty miles is too far for much soot to travel, despite statements elsewhere in the Draft EIS that "smoke would be transported by the wind and would eventually affect surface areas at a distance from the fire."[53] Third, it fails to mention the effect that soot, or black carbon, could have on sea ice, even though deposition onto ice is one of the primary ways in which black carbon has an effect on climate change.

These effects are reasonably foreseeable, and therefore BOEM must fully assess the potential for black carbon pollution to contribute to climate change, including the significance of its emissions in the Arctic as a regional pollutant.

V. The Draft EIS fails adequately to take into account climate change in its analysis of the effects of lease sale activities over time

The Draft EIS acknowledges that climate change is occurring in the Arctic and describes some of its effects in the background section.[54] In places, the Draft EIS integrates climate change into its effects analysis. In its analysis of the lease sale's effects on lower trophic organisms, for example, the draft discloses in a qualitative way that effects from the lease sale that occur further in the future may have different effects on these organisms because the baseline will have changed, and those organisms may have grown more vulnerable due to climate change and ocean acidification.[55] By and large, however, the draft does not meaningfully integrate climate change into the effects analysis. For ice-dependent species such as walruses, for example, the draft analysis does not discuss how impacts from oil activities may affect the species differently over time as the population becomes more vulnerable due to reduced sea ice or as habitat ranges shift. The Draft EIS discusses broadly in the cumulative effects section how climate change could affect walruses.[56] But when it discusses the effects of the oil and gas scenario on walruses, it ignores climate change altogether, describing effects as if

[50] U.S. EPA, Report to Congress on Black Carbon, EPA-450/R-12-001 (Mar. 2012) at 111; *see also id.* at 94 (Alaskan wildfires likely to affect Arctic snow and ice due to close proximity).
[51] *Id.* at 104.
[52] Draft EIS at 188.
[53] *Id.* at 441.
[54] Draft EIS at 61-68.
[55] *See, e.g.*, Draft EIS at 194, 198.
[56] *Id.* at 607 (citation omitted).

they occurred over a static baseline.[57] But, disturbance may have a very different consequence to walruses in 2014, for example, than in 2050, when the Chukchi Sea may well be ice free in summer months. BOEM must incorporate this critical, dynamic analysis fully into its EIS, because without it, the disclosure of effects is incomplete and misleading.

VI. The Draft EIS does not consider an adequate range of alternatives

Much has changed since Lease Sale 193 originally was held in 2008. BOEM and others have conducted numerous studies and have gained a deeper, though still incomplete, understanding of the Chukchi Sea ecosystem, including a better spatial understanding of what areas in the Chukchi Sea may be important for different species.[58] BOEM has adopted a "targeted" approach to future leasing in the Arctic Ocean that seeks to incorporate this new information into its decision-making.[59] As described elsewhere, new information also has emerged about the continued lack of oil spill preparedness and companies' inabilities to operate in Arctic Ocean conditions. The Draft EIS, while acknowledging the existence of this information,[60] does not incorporate it into its analysis. For example, it does not integrate the information into its consideration of alternatives. Rather, BOEM considers only the same three action alternatives it considered in the original 2007 EIS—three different-sized coastal deferral areas. But, as BOEM all but acknowledges in the Draft EIS, these alternatives do not provide an adequate range of choices for the decision maker. Because the agency takes the existing leases as the starting point for its analysis, the alternatives reduce to the following: affirm all the still-active leases sold in 2008 (alternatives I and IV); affirm 98.9% of these leases (alternative III); affirm none of the leases (alternative II (no action)).[61] These limited alternatives fail to provide the Secretary with a meaningful range of choices about which areas in the Chukchi Sea to open to oil and gas activities, the very considerations that are at the heart of the lease sale stage decision, and the Draft EIS thus clearly is insufficient to satisfy NEPA.[62]

Instead of embracing alternatives that would give the Secretary meaningful choices, BOEM works hard to reject them. For example, it states that it will not consider an alternative that would defer leasing in areas that could affect the Hanna Shoal.[63] It offers several reasons for rejecting the alternative, none of which justify the choice. The Draft EIS states that the alternative need not be considered because not many leases in the Hanna Shoal area were issued

[57] *Id.* at 288-89, 290 (citation omitted).
[58] *See, e.g.*, National Audubon Society, et al., Comments on Call for Information and Nominations, Proposed Chukchi Sea Lease Sale 237 (Dec. 3, 2013), *available at* http://www.regulations.gov/#!documentDetail;D=BOEM-2013-0015-0028.
[59] BOEM, Proposed Final Outer Continental Shelf Oil & Gas Leasing Program 2012-2017 (June 2012), at 6-12 (2012-2017 OCS Leasing Program); 78 Fed. Reg. 59, 715, 59,716 (Sept. 27, 2013) (call for nominations for Chukchi Sea lease sale 237).
[60] *See* Draft EIS at 14 (noting BOEM considered extensive information about important areas submitted for the call for information for lease sale 237).
[61] *See* Draft EIS at 159 (acknowledging that alternatives I and IV are "effectively the same" for purposes of the environmental effects analysis and analyzing the two alternatives "together as one"); *id.* at 39 (describing lack of difference of effects among alternatives).
[62] *See, e.g., California v. Block*, 690 F.2d 753 (9th Cir. 1982) (EIS must contain a range of alternatives sufficient to permit a reasoned choice).
[63] Draft EIS at 14-15.

pursuant to the original lease sale, companies have not shown interest in exploring the leases that were issued in the area, and the leases themselves contain stipulations that would mitigate effects. But the presence of leases in the sensitive area is not a reason to *reject* an alternative that considers deferrals that would protect the area—it is a reason to *consider* such an alternative. That companies that hold the leases may not covet them may be relevant to the implementation of a decision not to affirm the leases, but it certainly is not a reason to reject alternatives that would protect the area from leasing and if anything, support such an alternative. BOEM also rejects consideration of a Hanna Shoal deferral alternative on the basis that later, site-specific review of activities and future mitigation, including under the Marine Mammal Protection Act, will provide sufficient protection of the area's marine mammals and other species.[64] But, as the Ninth Circuit made clear in the decision to remand the lease sale decision, future site-specific analysis does not excuse consideration of effects and alternatives at the lease sale stage, because the lease sale decision itself is a consequential, spatial decision about which areas to open for oil activity.[65] Further, BOEM's own assessment of the coastal deferral alternatives is inconsistent with its dismissal of a Hanna Shoal alternative on the basis of mitigation because the same mitigation measures apply to the coastal deferral areas. BOEM's rejection of viable alternatives, such as a Hanna Shoal deferral, violates NEPA.[66]

BOEM must develop alternatives that provide the Secretary with meaningful choices beyond affirming the sale as it was held or rejecting the sale altogether. A meaningful range of alternatives would provide the Secretary with information about the variable effects of a decision to affirm some of the leased areas and reject others. For example, the agency could develop a set of alternatives that offers different levels of protection for the Hanna Shoal area by deferring from leasing areas on the shoal itself, on the shoal and in species' travel corridors to and from the shoal, or in all areas where activities or oil spills could have effects on species' use of the shoal. It could formulate alternatives that supply lease restrictions, such as time and place restrictions or restrictions on overall activity levels, that address the larger anticipated level of activities and effects. Similar alternatives could be considered for other areas of the Chukchi Sea harboring important resources, including the Barrow Canyon area or areas with unique benthic or coral communities.

Formulating and analyzing new alternatives, as NEPA here requires, will necessitate a substantial amount of work. BOEM will have to apply its own analysis to determine whether there are other areas like the Hanna Shoal that warrant additional protection from leasing or other restrictions, like time and place restrictions, that should be incorporated into new alternatives. BOEM will have to describe how activities in different areas under consideration for leasing will have differential effects. To the extent information is lacking to permit such analysis, BOEM will have to assess pursuant to 40 C.F.R. § 1502.22 whether the information is essential to developing alternatives and to a reasoned choice among alternatives. Consideration of different alternatives also may require BOEM to assess whether and how each alternative would vary the overall likely level of activity projected in the scenario for each alternative. Removing areas

[64] *Id.*
[65] *Native Vill. of Point Hope v. Jewell*, 740 F.3d at 504.
[66] *Southeast Alaska Conservation Council v. Federal Highway Admin.*, 649 F.3d 1050, 1056 (9th Cir. 2011) ("We have repeatedly recognized that if the agency fails to consider a viable or reasonable alternative, the EIS is inadequate.")

from leasing removes the potential resources in those areas and may influence the resource base upon which BOEM bases the scenario it uses to assess effects. This information about variable potential development levels would be important for a decision maker deciding among a reasonable range of alternatives.

VII. BOEM must improve its analysis of oil spill effects by updating or replacing the Oil Spill Risk Analysis Model, presenting data in ways that do not minimize the effects of oil spills, and analyze the potential effects of the use of dispersants in the Chukchi Sea

In the Draft EIS, BOEM continues to make extensive use of the "Oil Spill Risk Analysis" (OSRA) trajectory model to estimate the risk of damage to Alaska'a coastline and other sensitive areas from an oil spill. The Draft EIS, however, does not account for the lack of quality data, account for the inherent limitations of this model, or explain why the agency refuses to use more sophisticated models despite the fact that they have been used for years by other governmental agencies throughout the world.

A. The Draft EIS does not account for the consequences of climate change on the Oil Spill Risk Analysis Model

In 2011, BOEM published a report that provided scientific recommendations and alternatives that the agency is to use as guidance for evaluating data in Arctic Ocean oil spill trajectory analyses.[67] The Arctic Climate Change Report explained that BOEM "uses surface current, ice movement and concentration, and wind data derived from ocean circulation hindcast models for oil-spill trajectory calculations used in lease sale National Environmental Policy Act (NEPA) documents."[68] It concluded, however, that:

> [R]ecent climate variability in the Arctic Ocean has caused significant changes in the circulation of sea ice and the upper layers of the Arctic Ocean. . . . The majority of the circulation datasets used in the OSRA model do not account for these recent changes, thus there is a need to assess how forecast ice/ocean model results influence oil spill trajectories and associated risk assessments.[69]

The experts emphasized the need for better data and information to inform the OSRA modeling, including information regarding circulation, meteorology, and sea ice.[70] The report explained that "[n]ew datasets of modeled surface currents, winds and ice concentration for use in OSRA

[67] *See* Science Applications International Corporation, *Evaluation of the Use of Hindcast Model Data for OSRA in a Period of Rapidly Changing Conditions Final Workshop Report*, OCS Study BOEMRE 2011-032 (June 30, 2011) (Arctic Climate Change Report).
[68] *Id.* at 2.
[69] *Id.*
[70] *Id.* at 40-41.

will be delivered in 2012."[71] The experts also made specific recommendations to improve the use of OSRA given changing Arctic conditions.[72]

The Draft EIS, however, appears to have ignored all of these recommendations, and it did so without explanation. It does not, for example, explain whether the agency used these new datasets or, if it did, what consequence they had on the agency's analyses. Indeed, the trajectories in BOEM's analyses are run using ice data from 1986-2005 and wind data from 1986-2004, which may be outdated and fail to reflect likely future conditions in the Chukchi Sea.[73] The Draft EIS also does not employ any of the substantive recommendations for improving this outdated model. The Draft EIS must be based on contemporary data and respond to expert criticism regarding the weaknesses of the OSRA model.

B. BOEM should use a more up-to-date trajectory model

BOEM has decided to rely on OSRA despite the fact that there are more sophisticated models already in use by other federal and state agencies. The following discussion highlights various limitations of the OSRA model and then outlines other spill trajectory models that are already in use and do not have these same weaknesses. BOEM should use one of these more sophisticated models on its impact assessment in order to use the best available information in the EIS.

First, the OSRA model assumes that spilled oil is a point—it does not account for spreading of spilled oil, for the possibility that different parcels of a spreading oil slick may travel along different trajectories, or that these parcels may re-converge at locations distant from the spill origin, all of which are important aspects of the behavior of actual oil spills. BOEM must base its analysis on an assumption that is more defensible because oil spills do not move along a single path.

Second, the model assumes that once the single point of spilled oil contacts the coast, it stops. In other words, it assumes that a spill can never contact the mainland at more than one place. Thus, the model greatly minimizes the assessment of the adverse effects on coastal and shoreline areas, because if the oil hits land the modeling stops—despite the fact that oil could contact land at multiple and repeated locations during the course of a spill and throughout spill response activities.

Third, OSRA only considers surface oil spill trajectories despite the fact that the surface and sub-surface flow may differ.[74] In the Chukchi in particular, the variations of the subsea currents can be extreme depending on the location. During an Arctic Open Water meeting in 2012, a senior scientist with the environmental research firm ABR Inc. explained that he had "never seen a system in which you can have such dramatic changes, environmentally, in such a

[71] *Id.*
[72] *See id.* at 44-46.
[73] Draft EIS at A-1-2.
[74] *See* Arctic Climate Change Report at 12.

short distance."[75] The subsurface water is "funneled into several huge north-south subsea channels, including the Barrow Canyon, off northwest Alaska, and a channel that is more central to the Chukchi Sea shelf."[76] The water tends to flow around the major shoals because they are high points in the subsea topography. For example, "[b]ecause of the locations of the Statoil leases and the Burger prospect on the south side of a major shoal called the Hanna Shoal, cold water tends to persist in these areas, spinning in place rather than moving out."[77] BOEM must account for the dramatic variations of the subsea currents and the impacts the subsurface currents have on the agency's ability to understand the effects of oil spills on the Arctic Ocean environment.

Fourth, OSRA fails to account for weathering. The agency uses the SINTEF model to evaluate weathering effects on spilled oil, but it is independent of the agency's use of the OSRA model to evaluate trajectories. This makes it impossible for the agency to evaluate effects related to, for example, the increasing propensity of oil to sink as it weathers. The agency must integrate these analyses to assess the impacts of oil spills.

Given all of these limitations, BOEM should adopt and adapt one of the readily available models that provide the public and decision-makers better information regarding spill trajectories. For example, the National Oceanic and Atmospheric Administration (NOAA) uses the General NOAA Oil Modeling Environment, which predicts how wind, currents, and other processes might move and spread oil spilled on the water, explains how these predictions of where and how oil might move are affected by uncertainty in observations and forecasts for ocean currents and wind, and accounts for how spilled oil is expected to weather during the time that it remains on the water surface.[78] It also provides for "Best Estimate" and "Minimum Regret" trajectories by providing information about where the spill is most likely to go (the Best Estimate solution) and the uncertainty bound (the Minimum Regret solution).[79]

OILMAP is an oil spill model designed for oil spill response and contingency planning.[80] It is used in more than 40 countries around the world and is considered the world-wide industry standard for oil spill models.[81] It predicts the surface trajectory of spilled oil for either instantaneous or continuous spills and includes algorithms for oil spreading, evaporation, emulsification, entrainment and oil-shoreline interaction.[82] The model uses an integrated GIS

[75] Bailey, A., Chukchi Sea Depths Hold Vast Environmental Complexities, Alaska Dispatch News (Apr. 23, 2012) (http://www.adn.com/article/20120423/chukchi-sea-depths-hold-vast-environmental-complexities).
[76] *Id.*
[77] *Id.*
[78] *See* NOAA Office of Response and Restoration, GNOME Overview, *available at* http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/gnome.html.
[79] *See* NOAA Office of Response and Restoration, GNOME's Trajectory Overview, *available at* http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/gnomes-trajectory-predictions.html.
[80] *See* OILMAP: Oil Spill Model and Response System Overview at 1 (*available at* http://www.asascience.com/software/PDF/ASA_OILMAP_Overview.pdf).
[81] *Id.* at 2.
[82] *Id.* at 4.

system that allows the user to overlay spill trajectory and GIS data (e.g., biological resources, oil spill cleanup equipment, etc.) that makes the system a powerful tool for planning.[83]

Enclosed with these comments as Exhibit 1 is a report that uses OILMAP to model hypothetical oil spills from Shell Oil's lease locations in the Chukchi Sea. It demonstrates how more sophisticated modeling can provide a more detailed picture of what an Arctic Ocean spill might look like.[84] BOEM must consider this report and its modeling.

Australia uses the Oil Spill Trajectory Model (OSTM), which incorporates HYDROMAP (a hydrodynamic model), and OILMAP.[85] OSTM, among other features, can predict weathering and surface and subsurface transport of oil slicks, perform risk assessments for important shorelines and environmental resources, and account for floating or fixed sea ice in Antarctic waters.[86] OSTM also can display natural resources affected by the oil and measure the extent of shorelines affected by oil.[87]

All of these models provide more information than the rudimentary OSRA model. BOEM can and should be employing comparable models to inform its decision-making in the Arctic Ocean to meet its obligation to base its analyses on the best available information.

C. The oil spill analysis groups data in ways that may minimize the effects

The Draft EIS groups data in ways that may obscure important information. For example, trajectory data is presented for large chunks of time. A summer spill, for instance, is a spill that begins anytime between June 1 and October 31.[88] But, as other modeling runs demonstrate, spills in July may act very differently than spills on October due to different wind, ice, and current conditions.[89] Lumping these time-periods together in the analysis may distort and minimize these differences.

The sizes of the large oil spills BOEM purports to analyze in the Draft EIS differ markedly from those analyzed in the 2007 EIS. In the 2007 EIS, BOEM assessed a pipeline spill of 4,600 bbl. In the new Draft EIS, it assesses a pipeline spill of only 1,700 bbl. In the 2007 EIS, BOEM analyzed a platform spill of 1,500 bbl. In the new Draft EIS, it assesses a platform spill of 5,600 bbl. The differences appear to be the result of BOEM's use of different data sets in the 2007 EIS and the new Draft EIS. The new Draft EIS includes more recent data, which seems appropriate, but BOEM has used different time periods for pipeline spill data and platform spill

[83] *Id.*
[84] Exhibit 1: EmergConsulting, Stochastic Modelling of Oil Spills in the U.S. Chukchi and Beaufort Seas, Review Draft (Oct. 2014).
[85] *See* Australian Maritime Safety Authority, Oil Spill Trajectory Model Top 30 Question (*available at* http://www.amsa.gov.au/environment/maritime-environmental-emergencies/national-plan/General-Information/OSTM/faq/answers.asp#questionthree).
[86] *Id.* at Question 6.
[87] *Id.* at Question 5.
[88] Draft EIS at A-10.
[89] Exhibit 1 at 17 (showing shortest time for oil spills to reach shore is 38.7 days in July but only 2.2 days in October).

data. For pipeline spill data, the new Draft EIS uses pipeline data only from "the last fifteen years."[90] (The original 2007 EIS used data from 1985-1999.)[91] For platform data, it uses data from 1964-2010.[92] (The original 2007 EIS used data from 1964-1999.)[93] The use of the larger data set for platforms may diminish the mean size by diluting the effects of the Deepwater Horizon spill. The use of the smaller data set for the pipeline spills may diminish their size by omitting larger historical spills. The numbers appear to bear that out. BOEM should use consistent and defensible data sets which allow for a full understanding of the potential risks.

BOEM should analyze larger-sized spills in its assessment of the lease sale's effects. In the effects section of the Draft EIS, BOEM assumes there will be two large oil spills during the life of Chukchi Sea lease sale oil development. BOEM decided to assume that the large spills that would occur would be median-sized spills for platforms and pipelines. In the case of platform spills, the median spill size is orders of magnitude smaller than the average spill size (5,066 bbl. versus 395,500 bbl.).[94] BOEM justifies using the median size with the statement that average spill size "is not a useful statistical measure."[95] BOEM should explain its conclusion more fully. But NEPA requires BOEM to assess all reasonably foreseeable effects, not necessarily the statistically most probable effect, and thus BOEM should consider assessing larger-sized spills in its effects analysis.

BOEM's oil spill analysis is flawed in two additional ways. The Draft EIS[96] does not disclose the ocean surface area that would be contacted by a very large oil spill, which is part of the analysis conducted in the 2011 revised supplemental EIS,[97] and should be conducted here. BOEM has in places overstated the capacity to respond to oil spills in the Arctic. For example it states "[l]arge spills during the open water season could much more easily be addressed and would be unlikely to produce anything greater than negligible effects on bearded seals, and the spill response and cleanup activities should be prompt and effective."[98] These statements downplay the consequences of oil spills and are misleading in light of recent evidence and reports confirming the limits of oil spill recovery, including single digit percentages of recovered oil following the Exxon Valdez and Deepwater Horizon oil spills, as well as spill simulations in the Arctic Ocean.[99]

[90] Draft EIS at A-3.
[91] 2007 EIS at A.1-2.
[92] Draft EIS at A-3.
[93] 2007 EIS at A.1-2.
[94] Draft EIS at A-3.
[95] *Id.* at A-3.
[96] *Id.* at 438.
[97] 2011 SEIS at 160. *See also* Draft EIS at 502 (describing general patchy oil spill distribution without quantitative assessment); 2011 SEIS at 239.
[98] Draft EIS at 285.
[99] The Draft EIS, Draft EIS at 431, appears to use different land segments, boundary segments, and environmental resource areas than the 2011 revised supplemental EIS, 2011 SEIS at 153. BOEM should explain what is the reason for these changes.

D. BOEM must analyze the effects of the use of dispersants in the Chukchi Sea

The Draft EIS discusses the use of dispersants as a potentially viable response to large oil spills in the Chukchi Sea. However, it misrepresents the state of knowledge of how dispersants may function in Arctic conditions, overstates their effectiveness, and understates their potential toxicity. BOEM should redo its analysis and disclose the risks. Enclosed as Exhibit 2 to the comments is a report that perform a critical analysis of the existing research concerning oil dispersant effectiveness and toxicity in general, highlighting areas where Arctic conditions may contribute to unexpected or different outcomes; considers the possible consequences for Arctic species and ecosystems if dispersant were used on oil spills in the region; and concludes by identifying areas in which greater study of dispersants is needed, positioning each issue within the context of existing research.[100] BOEM must consider this report and integrate it into the EIS analysis.

VIII. BOEM has failed to take the hard look at potential lease sale impacts required by NEPA

BOEM is obligated to "prepare an EIS that in form, content and preparation fosters both informed decision-making and informed public participation."[101] "The impacts analysis must . . . contain some quantified or detailed information,"[102] and must not "improperly minimize negative side effects."[103] "General statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided."[104] At the lease sale stage, an EIS must give the decision maker a "clear idea how to visualize the environmental harms" of offshore oil and gas activity.[105]

While the Draft EIS describes in detail many *types* of environmental impacts associated with the lease sale and offers overall conclusions about impacts, with respect to analyzing the anticipated scale and severity of those impacts at the population level, it mostly "excludes the requisite quantified or detailed information . . . and neglects to explain why [BOEM] could not provide better or more specific information" in violation of NEPA.[106]

[100] Exhibit 2: Kris Weber and Joshua Axelrod, To Disperse, or Not to Disperse: Reviewing the Toxicity of Chemical Oil Dispersants and Implications of Their Use in Arctic Environments (Dec. 2014).
[101] *W. Watersheds Project v. Kraayenbrink*, 632 F.3d 472, 491 (9th Cir. 2011) (internal quotation marks omitted) (quoting *Native Ecosystems Council v. United States*, 418 F.3d 953, 958 n.4, 960 (9th Cir.2005)).
[102] *Sierra Club v. Bosworth*, 510 F.3d 1016, 1030 (9th Cir. 2007)
[103] *W. Watersheds Project*, 632 F.3d at 491 (internal quotation marks omitted) (quoting *Earth Island Inst. v. U.S. Forest Serv.*, 442 F.3d 1147, 1159 (9th Cir.2006), *abrogated on other grounds by Winter v. Natural Res. Defense Council, Inc.*, 555 U.S. 7, 129 S.Ct. 365, 375, 172 L.Ed.2d 249 (2008)).
[104] *W. Watersheds Project*, 632 F.3d at 491 (quoting *Blue Mountains Biodiversity Project*, 161 F.3d at 1213).
[105] *Mass. v. Watt*, 716 F.2d 946, 949 (1st Cir. 1983); *see also Native Village of Point Hope v. Jewell*, 740 F.3d 489, 504 (9th Cir. 2014).
[106] *Ocean Advocates v. U.S. Army Corps of Engineers*, 402 F.3d 846, 869 (9th Cir. 2005).

A. The Draft EIS's impact conclusions are not supported by species- or population-level analyses

The Draft EIS does not demonstrate that BOEM took a hard look at environmental consequences. To begin with, BOEM provides little or no information about how it arrived at its conclusions regarding impacts at the species- or population-level. For example, the Draft EIS describes the kinds of impacts oil and gas activities would have on individual pacific walruses[107] and offers the conclusion that the development scenario examined "could lead to long-lasting, widespread, and less than severe (i.e., moderate) impacts to walrus."[108] However, there is no analysis connecting the discussion of the kinds of impacts that might occur to the ultimate conclusion. BOEM does not build on its disclosure of how individual walruses may react to various industry activities to describe how these reactions would, or would not, result in effects to the population. BOEM does not attempt to correlate with any supported analysis the number of likely encounters, the way walrus react to vessels, the distribution of walrus throughout the year, the severity of disturbance under certain conditions, and the total number of walrus in the population, or other factors with the potential to impact walrus populations and thereby explain how or why the agency concluded the impact would be moderate. Other examples of this gap in analysis include the sections on fish[109] and gray whales.[110] Explaining how the agency reached

[107] These impacts are primarily walrus avoidance behavior and the destruction of benthic habitat. *See, e.g.*, Draft EIS at 288 ("impacts [of marine seismic surveys] are likely to be limited to temporary displacement or disturbance"); *id.* ("[w]alrus would likely be displaced from drilling sites by noise and activity"); *id.* ("exploration wells . . . would result in some loss of foraging habitat due to bottom disturbance"); *id.* at 289 (walrus may leave the ice, make hasty dives, or move off [due to vessel traffic]"); *id.* ("walrus moved 12.4 to 15.5 mi (20 to 25 km) from the operations where sound levels were 11% - 19% above ambient levels"); *id.* ("[e]ffects would probably be limited to slight changes in distribution with some walrus avoiding the area or retreating to the center of the ice floe"); *id.* ("[there would be] additional loss of benthic habitat over a period of 3-8 years for each area disturbed"); *id.* at 289-90 ("[w]alrus may be displaced due to noise and activity associated with pile-driving or other construction activities, dredging, or pipeline construction"); *id.* ("[w]alrus may be displaced due to noise and activity, and some foraging habitat may become unavailable to them for the duration of the productivity of the field"); *id.* ("discharge of drill cuttings, drilling fluids, and well cellar sediment that is calculated to be discharged into the water during various drilling activities . . . could impact the availability of benthic prey for walrus, especially if the wells are located in prime foraging areas"); *id.* at 291 ("[offshore oil and gas pipelines would result in] loss of foraging habitat over a period of approximately 25 years").
[108] *Id.* at 292. *See also id.* at 290 (listing factors depending on which "[i]mpacts to walrus could be negligible"); *id.* (noting that "[a]t the highest level of activity in the scenario and without appropriate mitigation, population level impacts to walrus could occur"); *id.* (concluding that with mitigation, "impacts to walrus at the highest level of development would be moderate").
[109] *Compare, e.g., id.* at 207 ("Physical and physiological, hearing impairment, and behavioral effects on fish and fish prey would occur at all depths of the Leased Area marine environment.") *and id.* at 208 ("Pressure waves from vessel hulls could displace fish in the surfacewater habitat and cause injury or mortality to non-swimming and weak swimming fish life stages and fish prey.") *and id.* at 220 ("If oil landed at an anadromous water entry point during spawning season, a distinct population unit of salmon could be reduced or lost.") *with id.* at 220 ("the impacts on fish . . . over all activities during years 6-9 would be moderate because the effects on fish behavior would be widespread, mortality of individuals would occur, oil spills could cause conditions of longer term chronic toxicity, and there would be potential for introduction of invasive species."). Although in this example the Draft EIS purports to offer

its conclusions is an essential part of the hard look NEPA requires and a basic requirement of rational agency decision making. Without this critical analysis, BOEM's conclusions about overall impacts are unsubstantiated and arbitrary, and the Draft EIS cannot support reasoned, lawful agency decision making.

B. The scale BOEM uses to describe conclusions about impacts is indeterminate

The failure of the Draft EIS to explain how BOEM reached conclusions about large scale impacts is compounded by the essentially meaningless ways in which BOEM describes those conclusions. For all environmental consequences analyzed in the Draft EIS, BOEM applied the same four-level scale in an attempt to categorize the magnitude and significance of impacts.[111] On this scale, impacts are categorized as "negligible," "minor," "moderate," or "major."[112] These labels alone are not informative. BOEM could conceivably have defined them in a way that would incorporate detailed information about impacts. It did not do so. Instead, the definitions BOEM provided simply rely on other imprecise terms that are not further defined in the Draft EIS.[113] "Negligible" impacts are defined as "little or no impact."[114] "Minor" impacts "are short-term and/or localized, and less than severe."[115] "Moderate" impacts "are long-lasting and widespread, and less than severe."[116] Finally, "major" impacts are "severe" and are "considered to be significant under NEPA."[117] "Severe" means "impacts with a clear, long lasting change in the resource's function in the ecosystem or cultural context."[118] The essential terms "little," "short-term," "localized," "long-lasting," "widespread," "clear change," and "the resource's function in the ecosystem" are undefined, and, as is apparent after parsing BOEM's descriptions of particular impacts, largely uninformative.[119]

reasons for the conclusion that impacts will be moderate, those reasons merely reiterate the kinds of impacts described elsewhere; they are not the logical steps connecting those impacts to BOEM's ultimate conclusion.
[110] *Compare, e.g., id.* at 278 ("Temporary physiological effects [of an oil spill] could arise from skin contact with oil, baleen fouling, hydrocarbon vapor inhalation, and localized prey reduction, petroleum consumption, consumption of contaminated prey, brief displacement from feeding/resting areas, and interruption of migration timing and routes.") *and id.* at 279 ("Perturbation, such as an oil spill, which caused extensive mortality within a high latitude amphipod population with low fecundity and long generation times would result in a marked decrease in secondary production.") (citation omitted) *and id.* ("[e]xposure of gray whales to large crude oil or condensate spills could result in lethal effects to a few individuals") *with id.* at 279 ("If a nearshore pipeline were to rupture, impacts would be long-lasting and widespread, but less than severe impact because of a large crude oil or condensate spill in the vicinity of Pt Lay- Barrow . . . . Otherwise the impacts of the Scenario on gray whales would be short-term and localized, and thus minor.").
[111] Draft EIS at 158.
[112] *Id.*
[113] With the exception of the word "severe," but as explained herein, its definition is also uninformative.
[114] *Id.* at 158.
[115] *Id.*
[116] *Id.*
[117] *Id.*
[118] *Id.*
[119] *See id.* The Draft EIS's description of marine and coastal birds takes a somewhat more informative approach by describing further impact scale, Draft EIS at 233-34, though the description still insufficient

Breaking down just one of these impact levels, "moderate," demonstrates the flaw in BOEM's approach to describing impacts. A "moderate" impact is one that is long lasting and widespread, and less than severe (i.e., less than a clear, long lasting change in the resource's function in the ecosystem or cultural context)). Piecing this statement together using the definitions provided in the Draft EIS, BOEM might mean that the impacts expected could result in a long lasting and widespread change in the resource's function in the ecosystem, but that that change is not expected to be very clear. Or, BOEM might mean that the impacts would be long lasting and widespread, and would clearly change the resource's function in the ecosystem, but that such *change* would not be long lasting. Furthermore, it is not clear in this context what BOEM considers long lasting (e.g., one year, five years, three generations); widespread (e.g., ten square miles, half of the planning area, the entire Chukchi, half of the population); clear (e.g., observed at the project level, generally accepted in the scientific community, statistically significant); or the resource's function in the ecosystem (e.g., avoiding extinction, maintaining historic migration patterns, maintaining stable population levels, maintaining a certain predator-prey equilibrium, some combination of metrics). In all, a "moderate" impact is so poorly defined that at one extreme, it could mean pervasive but miniscule behavioral changes, and at the other, changes that in the aggregate would reduce the population.

The opaqueness of the impacts scale is problematic enough, but the Draft EIS's discussion of environmental consequences is even more muddled because it departs from the impacts scale unpredictably, resorting to still more imprecise, undefined terms in its place. For example, BOEM predicts "population level impacts" to walrus at the highest level of activity in the scenario without mitigation.[120] The Draft EIS does not define "population level impacts" or place them on the four-level scale, and the discussion does not make clear what kinds of impacts could happen at a population level without mitigation. BOEM does not provide a threshold at which an impact becomes a population level impact. Nor does BOEM say how serious the population level impacts mentioned here would be.

At times the Draft EIS does not even address the significance of impacts, on its own scale or any other. With respect to the impacts of large spills on walruses, the Draft EIS simply describes the kinds of effects oil can have on individual walruses and says "[l]arge spills up to 5,100 bbls *could impact* walrus, particularly if they contacted marginal sea ice habitat or the shore near walrus haul outs."[121]

These two flaws—the omission of analysis of how types of impacts the EIS describes could affect species at the population level that is required to support the conclusions BOEM offers and the ambiguity of the impacts scale used to describe those conclusions—are consistent throughout the effects analysis in the Draft EIS. The following comments describe these and other deficiencies in BOEM's analyses of various species in the Draft EIS.

because it consists largely of vague terms and is silent on critical issues, such as how long it would take for a given species of bird to recover from a given major impact, or whether recovery would be possible.
[120] *Id.* at 290.
[121] *Id.* at 292 (emphasis added).

C. Examples of flawed analyses

a. Fish

The Draft EIS identifies "[f]ishes of concern" on the basis of "their distribution, abundance, trophic relationships, or vulnerability" that "would be affected" during each stage of the Scenario analyzed.[122] During years 1-5, the Draft EIS notes that several[123] of these fishes of concern would suffer mortalities as a result of exploration activities.[124] With respect to the impact of these mortalities on populations of fishes of concern, the Draft EIS states "[t]he combined mortalities are not likely to affect the populations of these species as is currently understood in the Chukchi Sea."[125] In conclusion, BOEM finds that "[o]verall, the impacts on fish . . . over all activities during Years 1-5 would be moderate because the effects on fish behavior would be widespread, mortality of individuals would occur, and there would be potential for introduction of invasive species."[126]

While these statements purport to convey information about impacts to fish, in fact they say nothing more than that certain species "of concern" will suffer an undisclosed amount of mortalities during years 1-5 of the Scenario. To begin with, the Draft EIS does not say what it is about these species' distribution, abundance, trophic relationships or vulnerability that is cause for concern. It is impossible to determine, for example, whether the concern for any one species is that it is very abundant and well-distributed, as a result of which exploration activities will result in numerous mortalities, or whether the concern is that they are not at all abundant and are clumped in a small area, as a result of which a small number of mortalities has a greater chance of affecting the overall population over time. Nor is the statement that "combined mortalities are not likely to affect the populations of these species as is currently understood in the Chukchi Sea" informative because of the two significant qualifications it contains. "Not likely" is not a defined term, and without such definition there is no indication what range of possibility it corresponds to. But even if the likelihood had been communicated more clearly, the sentence is still meaningless because the Draft EIS does not reveal how well or poorly the impact on these populations "is currently understood." If there are information gaps that prevent BOEM from disclosing these impacts in a meaningful way, the Draft EIS must not simply hint at their existence, but must grapple with them directly.[127] Finally, as explained above, labeling the impacts for years 1-5 "moderate" does not add meaning to an otherwise opaque disclosure.

Again, the Draft EIS discloses at length the kinds of impacts individual fish could suffer and the mechanisms by which those impacts come to pass, but glosses over the big picture, offering next to no information about how those impacts will collectively affect fish species. Alarmingly, the Draft EIS concludes that "[c]onsidering all time periods (Years 1-77, presented above) and all types of effects from the activities during these time periods . . . the impacts on

[122] *Id.* at 219, 225, 226.
[123] Herring, capelin, Arctic cod, pink salmon, chum salmon, and sand lance. *Id.* at 219.
[124] *Id.* at 219.
[125] *Id.*; *see also id.* at 220 (same, years 6-9); *id.* at 221 (same, years 10-25); *id.* at 226 (same, years 26-50 and 51-77).
[126] Draft EIS at 220.
[127] *See* 40 C.F.R. § 1502.22.

fish . . . of all species during Years 1-77 would be major" despite the fact that impacts from each individual stage are labeled "moderate."[128] Referring to the Draft EIS's impacts scale, this means that while for any particular stage BOEM concludes that activities will be "long lasting and widespread," but will not cause a "clear, long lasting change in the resource's function in the ecosystem or cultural context," at some point over the course of 77 years, such a change will occur as to all fish species.[129] The Draft EIS does not say what this "clear change" will be.

b. Beluga Whale

In addition to the pervasive problems caused by the ambiguity of the impacts scale and the omission of reasoning supporting ultimate conclusions, the conclusions BOEM draws in the belugas whale section are contradictory. For example, the Draft EIS states that "some belugas could be struck and killed by vessels,"[130] but later asserts that belugas "should be capable of avoiding vessels if needed."[131] Likewise, BOEM states that a large crude oil spill could have a "*moderate* impact" if certain conditions obtain,[132] but a page later contradicts itself, saying that "[l]arge crude oil, condensate, or fuel spills could have a *minor* effect on beluga whales . . . but only if" the same conditions described earlier are met.[133] The resulting lack of clarity as to the severity, extent, and duration of potential impacts to beluga whales is particularly egregious because BOEM explicitly acknowledges that individual belugas may be killed as a direct result of these activities.[134]

c. Bowhead Whale

The Draft EIS explains that "during the spring and fall migrations . . . *all* of the bowhead whale stock passes between the Leased Area and the Alaskan coast," increasing the likelihood that there will be "some mortalities" due to vessel strikes.[135] Under the circumstances, there is also a risk that a large crude oil spill could have "moderate to major effects" on bowhead whales.[136] Yet, puzzlingly, the Draft EIS concludes that "[c]ollectively, the IPFs in the Scenario would have negligible effects on bowhead whales."[137] This information, though woefully vague

[128] Draft EIS at 227; *id.* at 225 ("The impacts on fish . . . over all activities during Years 10-25 would be moderate because the effect on fish behavior would be widespread, mortality of individuals would occur, oil spills could cause conditions of longer term chronic toxicity, and there would be potential for introduction of invasive species."); *id.* at 226 (same, years 26-50); *id.* at 227 (same, years 51-77).
[129] *See id.* at 158.
[130] *Id.* at 273.
[131] *Id.* at 275.
[132] *Id.* at 274 (emphasis added).
[133] *Id.* at 275 (emphasis added).
[134] *See id.* at 273 ("With the numbers of vessels anticipated during the production phase, some belugas could be struck and killed by vessels."); *id.* at 274 ("If a large crude oil spill contacted a significant portion of [large groups of belugas feeding and molting in areas such as the Kasegaluk Lagoon], the effects would be greater than would generally occur in the Chukchi Sea, and might affect the population . . . . In such an event individuals or groups could be injured or killed, leading to a moderate impact.")
[135] *Id.* at 278 (emphasis added).
[136] *Id.*
[137] *Id.*

for reasons already explained, underscores the importance of meaningful analysis and disclosure of risks to bowhead whales that is lacking in the Draft EIS.

d. Gray Whale

The discussion of these impacts to gray whales is particularly vague, conclusory, inconsistent, and needlessly repetitive. For example, BOEM states that "[i]n the event of a large oil spill, some individual gray whales could be temporarily injured, and a small number of those could die;"[138] "[s]ome gray whales could experience injury or mortality as a result of prolonged exposure to freshly spilled oil; however, the number affected would likely be small;"[139] "[e]ffects of exposure of whales to spilled oil may but are not anticipated to result in lethal effects to a few individuals, and most . . . would likely experience a minor impact;"[140] "[e]xposure of gray whales to large crude oil or condensate spills could result in lethal effects to a few individuals; however, such an outcome is not anticipated."[141] These statements minimize negative impacts, but the Draft EIS does not provide a reasoned explanation for their optimistic outlook. BOEM does note that "[g]ray whales regularly migrate through one of the largest naturally occurring oil seeps in the world . . . and have done so for millennia, indicating they have the ability to either detect and avoid, or tolerate, crude oil in their environment."[142] However, the agency does not reconcile that point with its admission that a large crude oil spill could kill some gray whales.[143] Nor does it say whether the conditions obtaining in naturally occurring seeps are similar in relevant respects to those that would be expected during a large crude oil spill in the Chukchi Sea. Finally, although BOEM notes that gray whales' prey could be contaminated and reduced as a result of oil spills, the potential magnitude of impacts to gray whales from these prey effects is not described.[144]

e. Fin Whale

BOEM largely shirks specific analysis of impacts to this endangered species because "the numbers of individuals detected [throughout the OCS of the Chukchi Sea] have always been very low."[145] Just *how* low these numbers have been, and how low they are relative to the population of fin whales, the Draft EIS does not specify. Worse, "[t]hough fin whales differ from bowhead whales in many ways, [BOEM's] *assumption* is that their auditory abilities, sensitivities, behavior, and physiology is close enough to bowhead whales that the effects analysis for bowhead whales is applicable to fin whales."[146] The Draft EIS does not say whether this

[138] *Id.* at 278.
[139] *Id.* at 279.
[140] *Id.*
[141] *Id.*
[142] *Id.* at 279.
[143] *See id.* at 278-79.
[144] *See id.* at 278 ("temporary physiological effects could arise from . . . consumption of contaminated prey"); *id.* at 279 ("[d]ispersants . . . affect benthic prey species, which may be detrimental to gray whales, particularly in feeding areas"); *id.* ("Perturbation, such as an oil spill, which caused extensive mortality within a high latitude amphipod population with low fecundity and long generation times would result in a marked decrease in secondary production.") (citation omitted).
[145] *Id.* at 279.
[146] *Id.*

assumption is necessary because information about impacts to fin whales is lacking. If so, BOEM must deal with the lack of information directly.[147] If not, there is no authority excusing BOEM from conducting a specific analysis of impacts to fin whales because, as the Draft EIS admits, fin whales differ from bowhead whales in many ways. At the very least, the Draft EIS must explain why—not merely assume—the effects analysis would be the same.

f. Humpback Whale

BOEM improperly substitutes the effects analysis for bowhead whales for a species-specific analysis of impacts to humpback whales despite the fact that "[h]umpback whales differ from bowhead whales in many ways;" the agency considers the characteristics of the two species "close enough."[148] This is not the 'hard look' NEPA requires. It is the same error that appears in the discussion of impacts to fin whales.

g. Killer Whale

BOEM improperly substitutes the effects analysis for beluga whales for a species-specific analysis of impacts to killer whales based solely on similarities in hearing, sonar and echolocation.[149] This is the same error that appears in the effects analyses for humpback and fin whales. The Draft EIS suggests that effects on individual killer whales would be the same as effects on individual belugas, but that these effects would be less significant for the species than they would be for belugas because killer whales are scarcer than belugas in the northern Chukchi Sea.[150] This may be logical, but it is hard to evaluate because BOEM does not supply any detailed information about the relative distributions of these whales relative to the rest of their populations. Nor does the Draft EIS acknowledge that differences between the two species, such as differences in preferred prey, will change the effects analysis – even though some of the effects analyzed for belugas are based on a characteristic with respect to which the two species differ.[151]

h. Minke Whale

BOEM repeats to the same error with minke whales. "Minke whales differ from bowhead whales in many ways," BOEM admits, "but their auditory abilities, sensitivities, and behavior remains similar enough to bowhead whales that the effects analysis for bowhead whales

[147] 40 C.F.R. § 1502.22.
[148] *Id.* at 281.
[149] *Id.* at 282 ("Killer whales have mid-frequency hearing, similar to that of beluga whales, and heavily rely on sonar and echolocation to feed and navigate. Consequently, their shared similarities indicate the effects analyses for beluga whales would also apply to killer whales.")
[150] *Id.* ("Collectively the effects of most IPFS in the Scenario on killer whales would be consistent with those for belugas and harbor porpoises . . . . Though a large oil, or condensate spill could have minor or moderate effects on beluga whales, such an event would have negligible effects on killer whales due to their scarcity, particularly in the northern Chukchi Sea, their seasonal use of the Chukchi Sea, and the lack of any concentration areas as occurs with beluga whales.").
[151] *Id.* ("[t]hese [killer whales] are believed to be part of a transient stock that primarily hunts other marine mammals"); *id.* at 275 ("[s]ome individualized [belugas] could experience . . . localized reduction in prey sources [and] consumption of petroleum and/or petroleum-contaminated food items").

is applicable to minke whales."[152] The Draft EIS does not disclose much about impacts to minke whales beyond drawing this comparison and noting that "the numbers of individuals detected have consistently been low" in the Chukchi Sea, leading BOEM to conclude that "the impacts of the Scenario on minke whales would be negligible."[153] But if the number of minke whales is low, it does not automatically follow that impacts on the species would be less serious. There is no way to tell from the discussion of the Draft EIS. There also is no way to know what BOEM considers consistently "low" numbers of minke whales, or whether BOEM finds that the number of minke whales detected is likely to be consistent with the number of minke whales present.

i. Harbor Porpoise and Ice Seals

The analyses for Harbor Porpoises and Ice Seals suffer from a variety of flaws similar to those already highlighted, such as substituting impact analyses for different species without sufficient explanation for why effects would be the same;[154] failing to provide meaningful details about the scale, duration or consequences of impacts;[155] and introducing additional ambiguous terms that further cloud the analyses.[156]

BOEM also needs to conduct a more in-depth analysis of the impacts of the action on bearded seals' benthic feeding habitat. Although the Draft EIS discusses benthic habitat disturbance in and around Hanna Shoal as it may affect Pacific walruses,[157] there is no mention of how this disturbance will affect bearded seals. Like Pacific walruses, bearded seals are primarily benthic feeders, and the area around the Burger prospect is important for bearded seals as well. BOEM must analyze and disclose the possible effects not only of planned benthic disturbances such as platform and pipeline construction, but also benthic disturbance from oil spills. A large or very large oil spill would destroy benthic habitat, and the sea floor likely would take a long time to recover. For example, researchers found that after the Deepwater Horizon in the Gulf of Mexico, benthic abundance and diversity was harmed in an area of 148 square kilometers around the wellhead, and they predicted recovery would take at least several

[152] Draft EIS at 282.
[153] *Id.* at 282-83.
[154] *See, e.g., id.* at 286 ("Ribbon seals . . . differ from bearded seals in many ways, but their auditory abilities, sensitivities, and behavior remains similar enough to bearded seals that the effects analysis for bearded seals is applicable to ribbon seals."); *id.* ("Ringed seals . . . differ from bearded seals in many ways, but their auditory abilities, sensitivities, and behavior remains similar enough to bearded seals that the effects analysis for bearded seals is applicable to ringed seals."); *id.* at 287 ("Spotted seals . . . differ from bearded seals in many ways, but their auditory abilities, sensitivities, and behavior remains similar enough to bearded seals that the effects analysis for bearded seals is applicable to spotted seals.").
[155] *See, e.g., id.* at 281 ("a large oil spill or condensate spill would affect a small number of [harbor porpoises], most likely less than 100 . . . [which] could lead to the deaths of *a portion* of the affected porpoises, which would equate to potential moderate impacts to harbor porpoises from large oil spills") (emphasis added).
[156] *See, e.g., id.* at 283 ("temporary"); *id.* ("brief"); *id.* ("to an excessive degree"); *id.* at 288 ("a large number"). In some places, the analysis for ice seals does a better job of communicating species level impacts. *See id.* at 287 ("any population losses should be recouped within one year"); *id.* at 288 ("losses to the population should be recovered within a year or two since the adult breeding population would survive to reproduce in subsequent years").
[157] *Id.* at 290-91.

decades.[158] Because Hanna Shoal is such a critical feeding area for bearded seals and walruses, BOEM must analyze and disclose such long-term impacts to benthic habitat.

The Draft EIS's treatment of the cumulative impacts of climate change and the proposed action on seals is conclusory and inexplicably rosy. It is hard to comprehend how BOEM has concluded that climate change in the Arctic will have mostly positive effects on bearded, ringed, ribbon and spotted seals.[159] Bearded and ringed seals were listed under the Endangered Species Act because climate change threatens them with extinction.[160] BOEM offers no support for its conclusions that climate change will be good for seals, nor can it, rendering the Draft EIS irrational. Moreover, as it does with polar bears, BOEM attempts to paint the proposed action as a minor event that will be overwhelmed by the major event of climate change, repeating this stock paragraph (with slight variations) for each seal species:

> Climate change effects to the Chukchi and Beaufort Seas will most likely have a positive effect on bearded seals; one that is expected to be greater and more profound than all of the past, present, and foreseeable human activities combined. The effects of the Proposed Action on bearded seals would be negligible, and would not appreciably add to, subtract from, or synergistically interact with other past, present, or reasonably foreseeable future activities, or climate change, to alter the condition of bearded seals in the Chukchi Sea during 21st century.[161]

This statement is conclusory and is not supported. To the contrary, it is very likely that the proposed action will act synergistically with *negative effects* of climate change to have greater effects on seals than either impact factor would have alone. Until BOEM confronts these synergistic effects its analysis will underestimate the negative effects of the proposed action and run afoul of NEPA.

j. Polar Bear

With respect to impacts on polar bears, BOEM finds that:

> Assuming minimum altitude requirements . . . are applied, and the avoidance of polar bears on shore or on ice, the effects of aircraft on polar bears would be limited to occasional short term disturbance . . . . Assuming MMPA authorization measures are enforced, impacts to polar bears at the highest level of development in the scenario would be negligible . . . . Because polar bears commonly move through oil industry areas on the North Slope and in the Beaufort Sea with only negligible impacts, it is likely that activity in the Leased Area would cause negligible impacts.[162]

[158] Montagna PA, Baguley JG, Cooksey C, Hartwell I, Hyde LJ, et al. (2013) Deep-Sea Benthic Footprint of the Deepwater Horizon Blowout. PLoS ONE 8(8): e70540. doi:10.1371/journal.pone.0070540.
[159] Draft EIS at 606-610.
[160] 77 Fed. Reg. 76740 (Dec. 28, 2012) (bearded seals); 77 Fed. Reg. 76706 (Dec. 28, 2012) (ringed seals).
[161] Draft EIS at 607.
[162] *Id.* at 293.

Even setting aside the merits of these statements, they are conclusory and uninformative. What constitutes "occasional" is unspecified, as is "short term." "Negligible" on the impacts scale in the Draft EIS means "little or no impact,"[163] but while it is clear that there will be some impact to polar bears,[164] BOEM offers no sense of scale other than the bald assurance that the impact is "little."

Additionally, the population estimate for the Southern Beaufort Sea (SBS) population of polar bears was recently revised downward from 1500 to 900.[165] Bromaghin et al. found that the SBS population declined by 25 to 50 percent between 2004 and 2006 due to unfavorable ice conditions.[166] BOEM must take into account this dramatic population drop when it considers the effects of the action on polar bears. Polar bears in the SBS population are in the midst of a significant decline caused by climate change, making them much more vulnerable to any other human-caused disturbances, especially a large oil spill.

The EIS's discussion of cumulative effects of climate change and the proposed action on polar bears is vague, conclusory and misleading. It treats the effects of oil and gas development as minor additive effects that will be lost in the deluge of major effects from climate change. According to the Draft EIS, "the greatest challenge for polar bear populations world-wide are warming temperatures and sea ice loss due to climate change. . . . The proposed action would have an additive effect . . . ."[167] But the effects of the proposed action in a changing climate are likely to be greater than merely the sum of oil and gas effects and climate change effects. For example, polar bears energetically stressed by climate change are more likely to succumb to harm sustained in an oil spill. Or, a polar bear that has already been forced to swim long distances because of a lack of sea ice could die attempting to avoid oil and gas development. While the Draft EIS alludes to climate change forcing more bears into interacting with humans,[168] it gives short shrift to the wide range of possible synergistic effects of oil and gas development in a changing climate.

D. Mitigation is improperly incorporated into projected impacts

In several places, the Draft EIS takes mitigation measures into account when projecting impacts. While an agency may incorporate mitigation measures into its analysis of the environmental effects of the action, in order to rely on mitigation to obviate further analysis, the

[163] *Id.* at 158.
[164] *See, e.g., id.* at 292 ("[s]ome polar bears may avoid areas of activity"); *id.* at 293 ("Icebreaking and ice management activities have the potential to displace polar bears and to decrease the size of floes and the amount of preferred habitat available to polar bears in the vicinity of the oil fields."); *id.* at 293 ("Large spills up to 5,100 bbl could impact polar bears, particularly if they occurred in marginal sea ice habitat or onshore near barrier islands.").
[165] Jeffrey F. Bromaghin, Trent L. McDonald, Ian Stirling, Andrew Edward Derocher, Evan S. Richardson, Eric Voth Regehr, David C. Douglas, George M. Durner, Todd Atwood, and Steven C. Amstrup *In press.* Polar bear population dynamics in the southern Beaufort Sea during a period of sea ice decline. Ecological Applications (http://dx.doi.org/10.1890/14-1129.1).
[166] *Id.*
[167] Draft EIS at 611.
[168] *Id.*

measure must be identified and its effectiveness analyzed.[169] The Draft EIS neither consistently identifies mitigation measures relied upon in estimating impacts, nor analyzes the effectiveness of mitigation measures relied upon.

Where mitigation measures are identified, their effectiveness is almost never examined. For example, mitigation measures are mentioned in the section on impacts to fish:

> The effects of small refined oil spills [on fish during years 1-5] would be limited by requirements such as spill-catchment equipment on vessels, exploration rigs, and at land facilities; deployment of booming equipment during offshore fuel transfers; and automatic shutdown of fuel lines triggered by decreased pressure.[170]

Yet, BOEM says nothing about how much those measures would limit the impacts of spills. In fact, it is not even clear whether BOEM expects all or some of those measures would apply; consequently it is not clear whether they have been factored into the analysis of impacts.

The Draft EIS often fails to clarify whether mitigation measures have been factored into estimated impacts. For example, with respect to impacts on bowhead whales, the Draft EIS states "[v]essel traffic . . . should not affect bowhead whales if the NMFS (2013) mitigations are incorporated."[171] But on the next page, the Draft EIS concludes that "[c]onsidering the levels of vessel traffic associated in [sic] the Scenario some [bowhead] mortalities would be likely."[172] This is not an appropriate way to incorporate mitigation into the analysis. Even if it were acceptable for BOEM to incorporate mitigation measures in other documents by reference, the reference to the NMFS document does not identify which specific measures BOEM concludes will mitigate impacts to bowhead whales, nor does it analyze their effectiveness. And again, it is unclear whether BOEM anticipates that the mitigation measures—whatever they may be—*will* apply.

IX. The Draft EIS fails meaningfully to analyze and disclose new information about the risks of drilling in the Arctic Ocean from Shell Oil's 2012 drilling season and the subsequent government reports

The Draft EIS contains cursory descriptions of Shell Oil's failed attempts to conduct exploration drilling in the Chukchi Sea in 2012.[173] The document should contain a more complete description of the events and the results of the subsequent government investigations, including the U.S. Coast Guard report on the Kulluk grounding, which does

[169] *See, e.g., City of Sausalito v. O'Neill*, 386 F.3d 1186, 1212-13 (9th Cir. 2004); *Selkirk Conservation Alliance v. Forsgren*, 336 F.3d 944, 957-58 (9th Cir. 2003). *See also Alaska Wilderness League v. Kempthorne*, 548 F.3d 815, 829 (9th Cir. 2008)), *opinion withdrawn and vacated*, 559 F.3d 916 (9th Cir. 2009) and *superseded sub nom. Alaska Wilderness League v. Salazar*, 571 F.3d 859 (9th Cir. 2009).
[170] Draft EIS at 220.
[171] *Id.* at 277.
[172] *Id.* at 278.
[173] *Id.* at 406, 414, 570.

not appear to be included in the draft at all.[174] It should also disclose and discuss the recent federal criminal plea entered by Noble Drilling, Shell's main operator, and the events that led to it.[175] In addition to describing these events and investigations fully, BOEM must incorporate the events and findings into its analysis of the risks of oil drilling in the Chukchi Sea. That the first attempt to drill in the sea in three decades ended in disabled drilling vessels, fines, a criminal plea deal, and other near misses is highly relevant to the agency's assessment of drilling in the Arctic. The information should be considered in describing potential effects and in designing lease sale stipulations and alternatives.

X. The Draft EIS's assessment of air pollution effects is inadequate

A. The air quality analysis does not account for the full amount of pollution that will be present

The Draft EIS's calculation of particulate matter is flawed because it omits secondary particulate matter. Fine particulate matter "is either directly emitted from a source (primary emissions) or formed through chemical reactions among pollutants emitted by the source or already in the atmosphere (secondary formation)."[176] While the air quality analysis section does consider direct emissions of particulate matter from the diesel engines used to operate vessels and drilling units, it omits any consideration of secondary particulate matter formation. The potential for formation of secondary particulate matter is particularly concerning here, where background pollution is already at 52.7% of the national ambient air quality standard (NAAQS) for 24-hour concentrations of coarse particulate matter (PM10) and 31.4% of the NAAQS for 24-hour concentrations of fine particulate matter (PM2.5).[177] It is also important because dark PM2.5, referred to as black carbon, contributes to climate change by diminishing the albedo effect of snow and ice. Because the secondary particulate matter emissions have never been analyzed for significance,[178] BOEM should perform that analysis to ensure that these NAAQS will not be exceeded.

Nitrogen oxides (NOx), sulfur dioxide (SO2) and volatile organic carbons (VOCs) are precursors of particulate matter,[179] and each of these pollutants will be emitted by routine operations or emissions from a large oil spill. The precursors, cumulatively and combined with primary particulate matter emissions, may substantially increase the concentration of particulate

[174] U.S. Coast Guard, Report of Investigation into the Circumstances Surrounding the Multiple Related Marine Casualties and Grounding of the MODU Kulluk on December 31, 2012 (Apr. 2, 2014).
[175] Indictment, *USA v. Noble Drilling (U.S.) LLC*, Case No. 3:14-cr-00114-RRB (Dec. 8, 2014); Plea Agreement, *USA v. Noble Drilling (U.S.) LLC*, Case No. 3:14-cr-00114-RRB (Dec. 8, 2014); Minutes, *USA v. Noble Drilling (U.S.) LLC*, Case No. 3:14-cr-00114-RRB (Dec. 19, 2014).
[176] EPA, Supplemental Statement of Basis, Noble Discoverer Drillship – Beaufort and Chukchi Sea Exploration Drilling Program, at 54 (July 6, 2011).
[177] Draft EIS at 586.
[178] EPA, Supplemental Statement of Basis, Noble Discoverer Drillship – Beaufort and Chukchi Sea Exploration Drilling Program, at 55 n.20 (July 6, 2011).
[179] *Id.* at 55 (SO2 and NOx); John H. Seinfeld and James F. Pankow, Organic Atmospheric Particulate Material, Annu. Rv. Phys. Chem., at 124 (Jan. 8, 2003) (VOCs).

matter over a 24-hour period.[180] When EPA issued permits for OCS exploration activities, the maximum modeled impact of nitrogen dioxide (NO2) in the Chukchi Sea for just one exploration program (Shell's *Discoverer* and support vessels) was 160.8 $\mu g/m^3$ for a one-hour averaging period, or approximately 85.5% of the relevant NAAQS.[181] During a large oil spill, "[t]otal VOC emissions would likely exceed the emissions exemption threshold."[182] Furthermore, the maximum modeled impacts of one exploration program in the Chukchi Sea combined with background concentrations were 60% of 24-hour NAAQS for PM10 and 67% of 24-hour NAAQS for PM2.5.[183] BOEM's analysis should account for primary and secondary particulate matter emissions from multiple exploration programs in order to assess more accurately the effects to air quality.

The current analysis also likely understates the potential emissions because, other than the drilling rigs themselves, the associated fleet is assumed to be continuously in motion, "caus[ing] engine exhaust to be discharged over a distance, spreading out the plume of pollutants."[184] But many of the support vessels will remain relatively near the drilling rig or spend a considerable amount of time at the rig. For example, Shell planned to use one of its icebreakers as an anchor handler[185] and the icebreakers will need to stay relatively close to the drilling rig when sea ice is present in order to protect the rig. The supply vessel, when operated in dynamic positioning mode, was permitted to emit 75 pounds per day of particulate matter and 117 pounds per hour of NOx under the EPA permit, and this pollution would be emitted while directly adjacent to the drilling rig.[186] All of these activities would happen in close proximity to the drilling rig, and it is therefore inappropriate to assume that these mobile sources "will not have the opportunity to continuously and steadily impact a specific location."[187] For purposes of determining the impact to air quality, the support vessels that are likely to remain close to the drilling rig, and particularly those that connect to the rig or spend a significant amount of time adjacent to the rig, should be included as part of the stationary source.

Finally, the cumulative effects analysis of air quality fails to mention the likelihood of increased shipping as the Arctic experiences less sea ice. There is great interest in reducing shipping times by routing vessels through the Northwest Passage, which is increasingly possible

[180] *See* John H. Seinfeld and James F. Pankow, Organic Atmospheric Particulate Material, Annu. Rv. Phys. Chem., at 122-23 (Jan. 8, 2003) ("both secondary and primary particles may simultaneously contribute to the ensemble of particles")
[181] EPA, Supplemental Statement of Basis, Noble Discoverer Drillship – Beaufort and Chukchi Sea Exploration Drilling Program, at 58 (July 6, 2011).
[182] Draft EIS at 186.
[183] EPA, Supplemental Statement of Basis, Noble Discoverer Drillship – Beaufort and Chukchi Sea Exploration Drilling Program, at 58 (July 6, 2011).
[184] Draft EIS at 173. *See also id.* at 184 (explaining that the analysis assumes that remaining sources are "mobile and subjected to dilution and diffusion"; "This distance is great enough to allow for sufficient dilution and diffusion to disperse pollutants to a negligible impact onshore.").
[185] EPA, Supplemental Statement of Basis, Noble Discoverer Drillship – Beaufort and Chukchi Sea Exploration Drilling Program, at 21 (July 6, 2011).
[186] EPA, OCS Prevention of Significant Deterioration Permit to Construct, Permit No. R10OCS/PSD-AK-09-01, at 67 (Sept.19, 2011).
[187] Draft EIS at 173.

as Arctic sea ice retreats. The Draft EIS should disclose the potential for pollution resulting from increased ship traffic in the Arctic and consider it in the cumulative effects analysis.

B. The exemption formula should not provide the basis for discounting effects to air quality

The Draft SEIS improperly relies on an outdated exemption formula to protect air quality instead of assessing what the air quality effects will actually be. For example, in its analysis of effects during years 10-25, it states that the number of exploration drilling units would increase from two to four, but assumes that the air quality impacts of this increase would be "negligible to minor," and that "should the emissions exceed any exemption emissions thresholds under 30 CFR 550.303(d), controls on emission sources would be required and the air quality impact would remain negligible."[188] But the emissions exemption formula does not include any factor addressing cumulative effects, and therefore it is irrelevant to the discussion of how air quality impacts will increase when the number of exploration rigs is doubled.[189] The question at the lease sale stage should be what the combined effect of these four exploration rigs would be on air quality.

Furthermore, reliance on the emissions exemption formula to protect air quality in the Arctic is cold comfort. As explained in greater detail in Alaska Wilderness League et al.'s comments on BOEM's regulation of air emissions, the formula reflects outdated air modeling science, outdated significance levels, and is based on a source's total annual emissions, despite evidence that short-term exposure to pollutants can adversely affect human health.[190] In the Arctic, where exploration sources are prohibited from operating year-round, this focus on annual emissions means that a larger amount of pollution may be emitted in a shorter period of time than in the Gulf of Mexico, where sources operate year-round, without exceeding the exemption limit.[191] The exemption formula is also inappropriate to rely upon in Alaska because it does not protect against the climate change effects that black carbon will cause when deposited onto offshore sea ice closer to the exploration, development, and production activities than to shore.[192]

XI. Additional flaws in the Draft EIS require revisions

A. The Draft EIS must discuss key unfulfilled recommendations since the 2010 Deepwater Horizon tragedy

Section 4.4.1 of the Draft EIS, provides a discussion of ongoing regulatory reform and government-sponsored research that describes some of the efforts undertaken by the federal government since the April 2010 Deepwater Horizon explosion and oil spill. What this section fails to include, however, is a complete and accurate discussion of key, recommended reforms to prevent oil and gas releases that have not been implemented since the Deepwater Horizon

[188] Draft EIS at 186.
[189] *See id.* at 174; *see also* 30 C.F.R. § 550.303(d).
[190] Alaska Wilderness League et al., Comments on the Bureau of Ocean Energy Management's regulations of air emissions from drilling operations on the Alaska Outer Continental Shelf, Docket No. BOEM-2013-0035 (June 21, 2013), at 6-7.
[191] *Id.* at 8.
[192] *Id.* at 8-9.

tragedy. These include reforms which must be made by Congress and regulatory reforms that the Bureau of Safety and Environment Enforcement (BSEE) has not yet proposed, much less finalized. Without these reforms in place, it is clear that Arctic Ocean oil drilling is not as safe and environmentally protective as it could be. These unfulfilled reforms should be described and incorporated into the effects analysis in the final EIS.

The National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (National Comission) issued three recommendations to Congress that should be addressed in the final EIS as they are critical to ensuring an effective legal framework for BOEM. These three key recommendations to Congress are:

1. "Significantly increase the liability cap and financial responsibility requirements for offshore facilities."[193] The National Commission, in its recommendations for decisionmakers report, provides a good discussion of this issue including information on why the existing modest liability cap and financial responsibility requirements provide little incentive for companies to improve safety practices. Additionally, with such low liability and financial responsibility standards, a significant number of injuries, natural resource damages, and government response costs could go uncompensated.

2. Protection for whistleblowers. The report states that Congress should "[p]rovide protection for 'whistleblowers' who notify authorities about lapses in safety . . . [by amending] the Outer Continental Shelf Lands Act or specific statutes to provide the same whistleblower protection that workers are guaranteed in other comparable settings."[194] The offshore industry clearly should have whistleblower protections comparable to those that exist in, for example, the pipeline industry.

3. Oversight funding. The report states that Congress should "provide a mechanism . . . for adequate, stable, and secure funding to the key regulatory agencies – Interior, Coast Guard, and NOAA."[195] The National Commission goes on to say that this funding would ensure that agency personnel can perform their duties including expediting permits and reviews as needed, and hiring experienced engineers, inspectors, scientists, and first responders.

Additionally, as BOEM knows, BSEE is developing two important rulemakings which will affect Arctic Ocean drilling safety, and these should be discussed in the final EIS. Both rules have not been proposed yet, but are critical elements in federal oversight of offshore oil and gas operations. These unissued rulemakings cover:

[193] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling, Recommendations (January 2011), at 45-47, *available at* http://cybercemetery.unt.edu/archive/oilspill/20121210200707/http://www.oilspillcommission.gov/sites/default/files/documents/OSC_Deep_Water_Summary_Recommendations_FINAL.pdf.
[194] *Id.* at 6.
[195] *Id.* at 8.

1. Blowout Preventer/Well Control upgrades. The technical report to the Secretary of the Interior, issued immediately following Deepwater Horizon in accordance with a Presidential directive, recommended a number of needed Blowout Preventer (BOP) rulemakings.[196] The National Academy of Engineering and the National Research Council also recommended that "BOP systems should be redesigned to provide robust and reliable cutting, sealing, and separation capabilities for the drilling environment to which they are being applied and under all foreseeable operating conditions of the rig on which they are installed. Test and maintenance procedures should be established to ensure operability and reliability appropriate to their environment of application."[197] Recommendation 4.3 of the National Academy report adds that "[i]ndustry and regulators should develop fail-safe design requirements for the combined systems of rig, riser, BOP, drilling equipment, and well to ensure that (1) blowouts are prevented, and (2) if a blowout should occur the hydrocarbon flow will be quickly isolated and the rig can disconnect and reposition. The criteria for these requirements should be maximum reasonable assurance of (1) and (2), and assured successful crew evacuation under both scenarios."[198] While BSEE has begun such a rulemaking covering BOPs and well control, it is far from being finalized and implemented.

2. Arctic-Specific Standards. The Ocean Energy Safety Advisory Committee (OESC), established after Deepwater Horizon under the Federal Advisory Committee Act, created an Arctic subcommittee to ensure that the differences between offshore drilling in the Arctic Ocean offshore and in temperate environments are addressed by BSEE's regulations and procedures. The OESC recommended that BSEE "develop Arctic-specific regulations and/or incorporate standards for prevention, safety, containment and response preparedness in the Arctic OCS."[199] The Arctic-specific rulemaking covering OESC's recommendations also is far from issuance.

B. The Draft EIS's failure to analyze the effects of tankering oil and gas to market is unjustified

The Draft EIS's failure to analyze the effects of transporting oil and gas to market by tanker is unjustified in light of the fact that to date, tankering is the *only method* that has been used to ship offshore Arctic oil to market. BOEM considered, but did not analyze, the option of using marine tankers to transport oil and gas to market. Instead, BOEM focuses solely on

[196] Department of the Interior, Increased Safety Measures for Energy Development on the Outer Continental Shelf (May 27, 2010), at 19-22.
[197] National Academy of Engineering and National Research Council, Macondo Well *Deepwater Horizon* Blowout: Lessons for Improving Offshore Drilling Safety (Dec. 14, 2011), at 4, *available at* http://www.nap.edu/catalog/13273/macondo-well-deepwater-horizon-blowout-lessons-for-improving-offshore-drilling.
[198] *Id.* at 65.
[199] Ocean Energy Safety Advisory Committee letter to Bureau of Safety and Environmental Enforcement Director James A. Watson (January 25, 2013), at 5, *available at* http://www.bsee.gov/uploadedFiles/BSEE/About_BSEE/Public_Engagement/Ocean_Energy_Safety_Advisory_Committee/OESC%20Recommendations%20January%202013%20Meeting%20Chairman%20Letter%20to%20BSEE%20012513.pdf.

pipelines, ostensibly because they are more "proven" in the Chukchi and therefore pose less economic risk.[200] "There is no precedent for direct tankering of oil from locations featuring the ice conditions which characterize the Leased Area in the Chukchi Sea," the Draft EIS explains.[201] "Overall," BOEM concludes that "the risks associated with direct tankering of oil from the Leased Area remain too high for direct tankering to be considered a viable strategy, *especially when a more proven strategy (i.e., pipelines) exists*."[202] This justification for failing to analyze tankering is misleading and does not withstand scrutiny.

While also far from "proven," tankering oil and gas has actually been accomplished in the Arctic. Earlier this year, a Russian offshore drilling platform in the Barents Sea sent "the world's first market-sized shipment of oil extracted from the floor of any marine body above the Arctic Circle" – by tanker.[203] By contrast, BOEM does not cite, and we are not aware of, any functioning offshore pipelines in the Arctic of the size and length contemplated in the Draft EIS. BOEM asserts briefly that the Barents Sea is warmer and experiences less ice hazard than the Chukchi Sea.[204] But both the Barents and the Chukchi Seas are seasonally ice-covered and have each experienced "[t]he most pronounced sea ice declines in the Arctic basin": 22 and 26 percent declines in September ice extent per decade, respectively.[205] BOEM should not rely on a superficial comparison to justify excluding an analysis of tanker transportation.

Proposals utilizing tankering instead of pipelines would shift and expand the scope of environmental impacts of Lease Sale 193. For example, they would change the risk of oil spills and change the scope of impacts to include in the Bering Sea because tankers would need to pass through it to get oil and gas to market. The Draft EIS does not address this risk.

In sum, tanker transportation is no less viable than pipeline transport, is not foreclosed by Stipulation No. 3, and would substantially alter the range of environmental consequences associated with Lease Sale 193. The Draft EIS is incomplete without a hard look at this method of transportation.

C. The Draft EIS's analysis of cumulative effects is flawed

The Draft EIS's cumulative effects analysis does not adequately discuss the risks of oil spills or their effects. The Draft EIS discloses that the cumulative oil development scenario assumes 6.3 Bbbl oil will be produced in the Chukchi Sea.[206] However, it does not disclose the risk of an oil spill associated with the production of this amount of oil. The cumulative effects

[200] Draft EIS at 19.
[201] *Id.* at 18.
[202] *Id.* at 19.
[203] Emily Gertz, *Russia Ships the World's First Load of Offshore Arctic Oil*, POPULAR SCIENCE (April 18, 2014), *available at* http://www.popsci.com/article/science/russia-ships-worlds-first-load-offshore-arctic-oil.
[204] *See* Draft EIS at 18.
[205] U.S. Geological Survey, *Arctic Sea Ice Decline: Projected Changes in Timing and Extent of Sea Ice in the Bering and Chukchi Seas* at 2 (2010), *available at* http://pubs.usgs.gov/of/2010/1176/pdf/ofr20101176.pdf.
[206] Draft EIS at 568.

section also fails to assess the oil spill risks and effects associated with the increased Arctic shipping it forecasts. Additionally, as is clear from the grounding of the Kulluk in 2012, there are risks from the mobilization of infrastructure to enable Arctic OCS drilling. All of these risks provide important information for the decision whether to open the Chukchi Sea to oil and gas leasing, and BOEM must disclose and quantify these risks.

The cumulative effects section also does not assess adequately the additive or synergistic effects of industrial activities and climate change. It discloses that climate change will occur and generally describes its effects. It describes generally the effects off industrial activity. But it never meaningfully puts the two together. In places, it describes that climate change will have a larger effect on species than industrial activity,[207] but this cannot substitute for the needed analysis of how industrial activities will affect species in a climate changed world.

D. BOEM does not explain the assumed volume of natural gas underlying the scenario

BOEM in the Draft EIS has expanded more than fourfold its forecast of the amount of oil that will be produced as a result of Lease Sale 193, from 1 Bbbl to 4.3 Bbbl, but it has reduced the amount of natural gas forecast to be produced from 2.75 Tcf to 2.2 Tcf.[208] The amount of natural gas forecast to be produced was, at least in the 2011 revised supplemental EIS, tied to the amount of oil forecast for production. BOEM must explain why the natural gas forecast has been reduced notwithstanding the increase in forecast oil production and/or why it has changed its methodology to decouple natural gas production from oil production.

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For the foregoing reasons, the Draft EIS requires substantial revisions to meet NEPA's requirements to inform the Secretary and the public about the effects of and alternatives to Lease Sale 193.

Thank you for considering these comments.

Respectfully submitted,

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[207] *See, e.g., id.* at 600 (beluga whale), 601 (bowhead whale), 602 (fin whale and gray whale), 603 (harbor porpoise), 604 (humpback whale and killer whale), 605 (minke whale), 606 (bearded seal), 608 (ribbon seal), 609 (ringed seal), 610 (spotted seal), 619 (caribou), 620 (muskox), 621 (grizzly bear), 622 (furbearing mammals).
[208] *Id.* at 34; 2011 SEIS at 86.

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EXHIBIT 1

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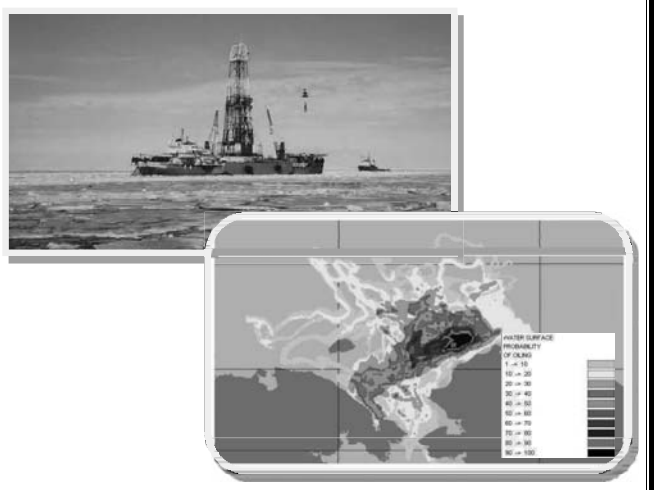


STOCHASTIC MODELLING OF OIL SPILLS IN THE U.S. CHUKCHI AND BEAUFORT SEAS

Mark West, EmergWest Consulting

October, 2014 **Review Draft**

Summary

The objective of this study is to identify and predict the water surface and shoreline reach potential of various crude oil release scenarios from existing leases under development in the Chukchi and Beaufort Seas.

This report presents the results of a stochastic model-predicted fate analysis for crude oil spills, using the world-wide industry standard OilMap software interface. Six release scenarios were simulated, three for each of the Chukchi and Beaufort Seas:

1. The first scenario modelled a crude oil release occurring in August that was capped within 10 days of the initial release. This scenario, which was modelled for 120 days, included a 20% removal rate for response countermeasures.
2. The second scenario modelled a crude oil release occurring in July that was capped within 33 days of the initial release. This scenario, which was modelled for 150 days, included a 20% removal rate for response countermeasures.
3. The third scenario modelled a crude oil release occurring in October that was not capped throughout the modelled timeline. This scenario was modelled for 90 days, and included no reduction of oil as a result of response countermeasures.

OilMap's stochastic trajectory and fate models were applied, using 100 randomly-selected start times (based on five years of historical wind and oceanographic data).

Using conservative assumptions and parameters, the model predicts 100% probability of shoreline impacts, both in Alaska and Russia, in the event of an uncontrolled blowout in October in the Chukchi Sea, and are almost certain (from 98% to 100%) in both Alaska and Canada, should the same scenario occur in the Beaufort during the same period. In the Chukchi spill scenarios, the range of possible marine impacts extends over 800 miles from east to west, and over 900 miles from north to south, and covers an area of over 300,000 square miles. In the Beaufort Sea spill scenarios, the range of possible marine impacts extends over 600 miles from east to west, and over 150 miles from north to south, and covers an area of over 30,000 square miles.

This report was prepared by EmergWest Consulting, of Abbotsford, BC, Canada, with financial support from the Natural Resources Defense Council. Author contact: mark@emergwest.com.

1 Introduction

Stochastic modelling is a probabilistic technique commonly used when determining future outcomes that may be expected to occur versus ones that are unlikely. It is based on computed assimilation and analyses of historical data that take into account a certain degree of randomness, or unpredictability. Stochastic models are not run just once, but many (sometimes hundreds) of times. The larger the collection of oceanographic and meteorological data and the number of runs, the higher is the expected accuracy of predicted outcomes. Stochastic modelling is not an absolute science, rather a valuable tool that can assist in the decision-making or planning process, such as the identification of reasonable mitigation to prevent or minimise the risk of an incident reaching and potentially affecting a sensitive area, or the allocation of adequate resources to be able to effectively respond to a spill related incident.

In this study, there were two areas of interest, specifically those areas in the Chukchi and Beaufort Seas where Shell Gulf of Mexico Inc. and Shell Offshore Inc., respectively have proposed drilling and production.

The world-wide industry standard spill prediction software 'OilMap' was used for this stochastic modeling analysis. OilMap is a computer-based spill model and response system developed by Applied Sciences Associates (ASA) that has been used internationally since the early 1990s by the major oil companies, governments, universities and research organizations (Appendix A).

OilMap data inputs include shoreline definition, area circulation features (i.e., local ocean currents), long-term local wind-time series data, spill location and hydrocarbon product properties and characteristics. The model output predicts water surface reach and shoreline areas that are most and least likely to be contacted by a spill, as well as the percentage of a model's simulations where a product is predicted to reach a shoreline. The stochastic simulations provide valuable insight into the probable behaviour of potential spills under the meteorological, oceanographic and river conditions typical to a specific geographic location, based on the historical local data.

Computer models inherently rely on multiple assumptions and approximations that can affect predictive outcomes. These may include complex model algorithms, physical and environmental conditions in an area, and properties and characteristics of the product being modelled. Although OilMap uses the best available data, results should be regarded only as "best estimates" of a product's likely or unlikely distribution and fate. Stochastic model predictions are useful for determining trends in a product's movement in the event of a spill, and areas most likely at risk.

OilMap's standard requirements for a stochastic study of spill releases include:

- A good description of the local geography (i.e., land and water boundaries);
- A good description of the major hydrodynamic circulation features of the water body(s); and
- A long-term (i.e., 5 years or more) local wind-time series dataset from one or more unobstructed coastal wind station(s), or numerical model data.

The objective of the stochastic modelling is to determine the probable geographic reach and fate (e.g., < 10% chance; 50% chance; > 90% chance) of a crude oil spill originating at the two study locations, identify areas

most and least likely to be contacted by a spill, and help direct the determination of spatial and temporal boundaries for the Fate and Effect Analysis of a spill.

For this analysis, six stochastic scenarios were modelled, with three separate scenarios for each of the two locations, each based on 100 individual simulations and with a randomly-selected, different start time within the selected period (i.e., 1 month). Shoreline data were obtained from the modelling software provider. The description of the local water circulation field was based on hydrodynamic data for the area provided by Tetra Tech, which retrieved and formatted the data from the North American Regional Reanalysis (NARR). Five years of local wind-time series data also came from Tetra Tech who retrieved and formatted the data from HYCOM global model (HYCOM 2013).

Delineation of the study area boundary and data used as input to the modelling are presented in Section 2 as are the modelling assumptions used. Results of the stochastic scenarios are presented in Section 3. Conclusions are provided in Section 4, and references in Section 5.

2 Study Area and Model Data

2.1 Study Areas

The Study Areas are located based on two proposed crude oil drilling locations in the Chukchi and Beaufort Seas (Figures 2.1 and 2.2).

Figure 2.1 Chukchi Sea Scenario Location

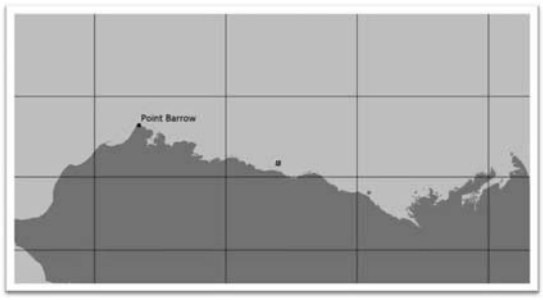


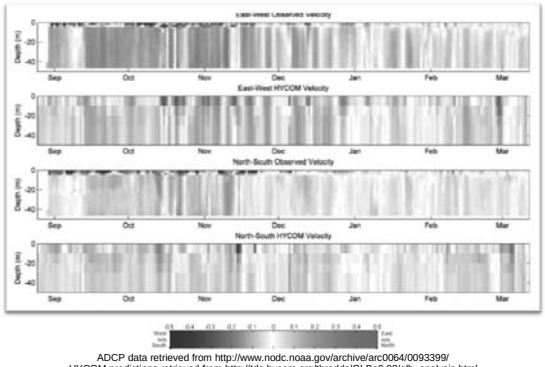
Figure 2.2 Beaufort Sea Scenario Location

2.2 Oceanographic/Hydrodynamic Data

Oceanographic data were retrieved from the HYCOM global model (HYCOM 2013). HYCOM is a three-dimensional model incorporating assimilation of observational data and real-time simulation of the global ocean and is maintained by a partnership associated with the Global Ocean Data Assimilation Experiment (GODAE). HYCOM simulates the global ocean on non-tidal timescales, with data available daily. Data were retrieved from the surface 'u' and 'v' fields, representing water velocity in the top ten metres of the water column.

2.2.1 Oceanographic/Hydrodynamic Data Quality Control

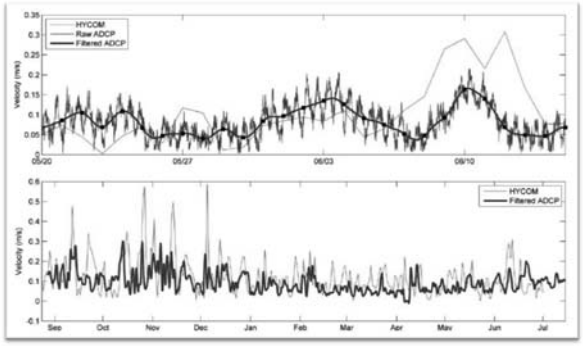
The currents in HYCOM are non-tidal in nature, with data available on a one-day time step. The predicted currents were compared against available observations by upward-looking Acoustic Doppler Current Profilers (ADCPs) deployed in 2011-2012. The ADCPs provide useful information on the tidal currents in the region, and also on the ability of HYCOM to match the residual (non-tidal) currents. Figure 2.3 shows a plot of the currents throughout the water column as predicted by HYCOM and observed by the ADCP HS01. The ADCP is moored at a depth of approximately 55 metres, facing upwards. The measurement of currents at the surface is less accurate than within the water column. The plots are split into comparisons of the east-west and north-south components of velocity.



ADCP data retrieved from http://www.nodc.noaa.gov/archive/arc0064/0093399/
HYCOM predictions retrieved from http://tds.hycom.org/thredds/GLBa0.08/glb_analysis.html

Figure 2.3 Comparison between HYCOM and Chukchi ADCP HS01 Full Water Column

The transport of water through the Bering Strait is generally northward, though the flow can be slowed or briefly reversed by adverse winds, common in winter. The 'Bering Water' often flows along the coast towards the northeast (Pickart 2004). In deeper waters north of the Chukchi shelf, the clockwise Beaufort Gyre dominates circulation. Currents are generally to the north and east at the location of the ADCPs, with occasional weak reversals where currents flow southwest. The model matches the general patterns of currents at this location, especially with regard to the timing of shifts from one regime to another. The surface currents from HYCOM are plotted against the top-most valid ADCP bin in Figure 2.4. The ADCP data are displayed in two forms, one with the complete time series including tidal currents (top panel), and one with a low pass filter applied to better match the HYCOM time intervals (bottom panel). The low-passed panel displays the full period of record for the ADCP deployment. The model matches some of the current variability, and in fact over-predicts velocity during a number of short events.



ADCP data retrieved from http://www.nodc.noaa.gov/archive/arc0064/0093399/
HYCOM predictions retrieved from http://tds.hycom.org/thredds/GLBa0.08/glb_analysis.html

Figure 2.4 Comparison between HYCOM and Chukchi ADCP HS01 Near-Surface Current Time Series

	ADCP HS01
Bias (m/s)	-0.004
RMS Difference (m/s)	0.098
Model Skill (-)	0.59

Table 2.1 HYCOM Model Evaluation

2.3 Meteorological Data

Historical wind data have been gathered from the North American Regional Reanalysis (NARR) (Mesinger et. al 2006) for a large portion of the Arctic Ocean every three hours since the late 1970s. The NARR is a reanalysis model, which means it incorporates observations into a numerical weather prediction model to provide the best estimate of meteorological conditions at all locations in the model domain. Data were retrieved from the fields 'ugrd10m' and 'vgrd10m' representing the wind velocity at a height of 10 metres over the sea or land surface (the industry standard for wind data and also the default wind height used by OilMap).

2.3.1 Meteorological Data Quality Control

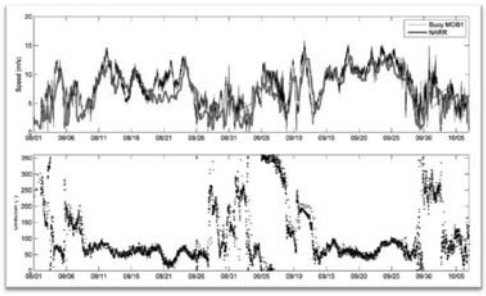
Evaluating the NARR model surface wind fields against wind speeds from nearby buoys allows an understanding of possible biases and errors in the model and provides confidence in using the modelled wind fields for spills throughout the region. Buoy data are available from a deployment in the Hanna Shoal region of the Chukchi Sea from August to October, 2011. Meteorological and oceanographic parameters measured by the buoys include wind speed and direction, air and sea surface temperature, statistical wave parameters, and near-surface currents. Land-based stations are less applicable to oil spill simulations, but considering the short periods of record available from the buoys a comparison between NARR and observed winds was also made at NDBC Station RDDA2, Red Dog Dock.

Wind speed and direction from NARR and the surface buoy MOB1 are plotted in Figure 2.5 Wind speeds at the buoy were corrected to the 10 m observation elevation. Figure 2.6 plots the same parameters against observations at Red Dog Dock. The NARR winds follow the pattern of storms and calm, though apparently under-estimate maximum wind speeds, especially at Red Dog Dock. As a result, a small adjustment was made in the OilMap wind input (within the normal range of 3 to 3.5%). Wind direction is well predicted even when speed discrepancies occur. Small temporal lags appear during some events, though these are less likely to impact spill prediction.

Statistics on the model's skill in matching observations at this location are presented in Table 2.2. The model bias is the average of the difference between observed and modelled (or reanalysis) wind speed. The negative model bias indicates that the NARR data show slower wind speeds than the observation. The best fit multiplier is the increase factor in NARR wind speeds that would result in a zero bias. This could be implemented as an increase in the wind drag factor.

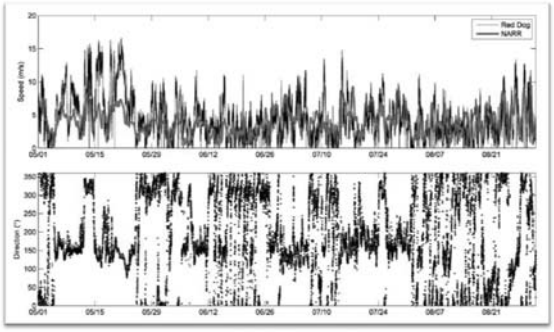
	Buoy MOB1	Red Dog Dock
Model Bias (m/s)	-0.81	-0.39
Best Fit Multiplier	1.115	1.089
Root Mean Square (RMS) Difference (m/s)	2.34	3.03
Model Skill (-)	0.85	0.72

Table 2.2 NARR Model Evaluation



Buoy data retrieved from http://www.nodc.noaa.gov/archive/arc0064/0093399/
NARR data retrieved from http://www.esrl.noaa.gov/psd/data/gridded/data.narr.html

Figure 2.5 Comparison between NARR and Hanna Shoal Buoy MOB1 Wind Speed and Direction



Red Dog (Station RDDA2) data retrieved from http://www.ndbc.noaa.gov/
NARR data retrieved from http://www.esrl.noaa.gov/psd/data/gridded/data.narr.html

Figure 2.6 Comparison between NARR and Red Dog Rock Wind Speed and Direction

Other statistical methods used to measure model performance are root-mean-square error and a comprehensive 'model skill' equation (Equation 2.1). Root-mean-square error is presented in the same units

as the original data and represents the magnitude of all errors over the entire predicted time period. Model skill is a measure of the agreement between predicted and observed data, with a skill of 100% representing a perfect match (Wilmott et al. 1981). It differs from the statistical correlation statistic r or r^2 in that a prediction that was perfect in magnitude but inverted in sign would still have a perfect r^2, whereas the skill would be negligible. The statistical analysis was performed without any speed correction. RMS error and model skill improve only slightly once a multiplier is applied.

$$Skill = (1 - \frac{\sum |X_{Model} - X_{Data}|^2}{\sum (|X_{Model} - \overline{X_{Data}}| + |X_{Data} - \overline{X_{Data}}|)^2})$$

Equation 2.1 Model Skill

2.3.2 Missing Meteorological Data

NARR data from 06-Oct-2011 21:00 to 10-Oct-2011 00:00 were incomplete or corrupted on the server. These data were replaced with the same time period in 2012. There was a modest (8-10 m/s) wind event during the 2012 time period used for replacement. Two similar single-day gaps on 19-Jan-2009 and 06-Jan-2010 were filled by repeating the data from the previous day.

2.4 Quality Control Data Sources

Quality control data sources were identified in the region, consisting of recent oceanographic measurement programs in the Chukchi Sea (CSESP 2014). Current meter data were available from the National Oceanographic Data Center (NODC) due to a data sharing agreement between NOAA, Shell, ConocoPhillips and Statoil. Locations of the meteorological and oceanographic validation data sources are shown in Figure 2.7, overlain on the bathymetry from the HYCOM model.

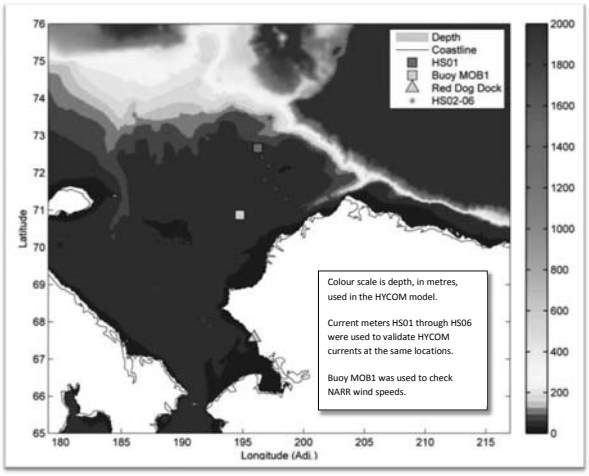


Figure 2.7 HYCOM and NARR Validation Locations Chukchi Sea

2.5 Characterization of the Crude Oil

The crude oil chosen for the study (Alaska North Slope [ANS] Crude Oil) was based on available literature, information provided by Shell to the US Department of Interior, as well as other oil spill modelling studies that have been conducted in the region. The properties and characteristics of ANS crude oil used in the modelling are summarized in Figure 2.8.

Figure 2.8 Key Characteristics of ANS Crude Oil

OilMap uses the oil's physical properties and characteristics to calculate processes involved in its weathering, including spreading, evaporation and dispersion.

The spreading of spilled oil on water occurs primarily due to gravity. Heavy, viscous products, such as bunker or some crude oils will spread relatively slowly. Evaporation rates of spilled products depend on the products' chemical characteristics (volatile products evaporate extremely quickly), the water temperature, and the wind speed.

Dispersion occurs when, due to wave energy at the water surface, the spilled product breaks into small droplets and is dispersed into the water column. ANS Crude Oil is considered Type 3 (Medium oil - Oil contamination of intertidal areas can be severe and long-term) by NOAA, and is on the list of "persistent oils" under MARPOL (International Maritime Organization).

2.6 Model inputs/Assumptions

A number of assumptions were used in order to run the models.

2.6.1 Sub-Surface Modelling Versus Surface Release

In the event of a release from the well-head, the actual source of the released crude oil would be at the ocean floor. A single well-head release scenario was run for both the Chukchi and Beaufort Seas, taking into account the specific parameters for each to determine if it was necessary to start the stochastic model at the ocean floor, rather than at the sea surface. The resulting trap height, trap diameter, and time to reach the ocean surface confirmed that, given this set of parameters (for both the Chukchi and Beaufort locations), starting the spill at the ocean floor did not materially affect the model results. Thus, the modelled scenarios assume an oil release at the sea surface.

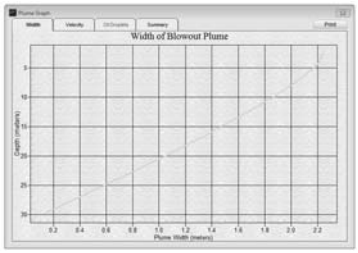


Figure 2.9 Width of Blowout Plume

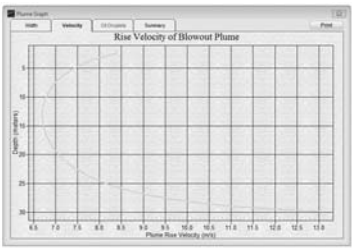


Figure 2.10 Rise Velocity of Blowout Plume

2.6.2 Release Rates

The release rates used in the models were based on AVALON/MERLIN discharge model output from the Alaska Outer Continental Shelf, Environmental Impact Statement/Environmental Assessment, Bureau of Ocean Energy Management, Regulation and Enforcement (OCS EIS/EA BOEMRE 2011-041) prepared by the Bureau of Ocean Energy Management, Regulation and Enforcement, Alaska. Specifically, the 10-day release scenario uses approximately the average of the rates predicted by the agency for the first 10 days of a release, and the 33-day release scenario uses approximately the average of the rates predicted over the first 33 days. As the AVALON/MERLIN model only predicted flow rates for 74 days, a conservative estimate of 30,000 bbls/day was chosen for the October scenarios.

In the July and August scenarios, these volumes are reduced by 20%, on the assumption that conventional and alternative countermeasures would be available and applied in those months (but not October because of pack ice formation). This is based on the total percentage of crude oil removed from the surface of the water through such countermeasures during the MC 252 (Deepwater Horizon) incident.

2.6.3 Release Durations

Three release durations were modelled for the Chukchi and Beaufort Seas:

- A release occurring in August (capped in 10 days, i.e., simulating a spill expeditiously controlled without a relief well), modelled for 150 days;
- A release occurring in July (capped in 33 days, i.e., a spill controlled by a relief well drilled as fast as the industry claims it could have one in place), modelled for 120 days;
- A release occurring in October that is not capped, i.e., a spill too late in the season to be effectively stopped before pack ice onset.

Significantly, the modelled scenarios did not factor in the movement of crude oil trapped in or under pack ice (oil was modelled as static once it encountered pack ice, while oil that did not encounter pack ice was tracked until the end of the scenario). This limited the effective duration of the modeling runs in all scenarios, thereby producing conservative estimates of oil spread in each.

2.6.4 Release Locations

As there are numerous possible proposed Shell drilling locations in each of the areas of interest, a single, central location was chosen for each (see Table 2.3):

Site	Latitude	Longitude
Chukchi Sea	71° 15' N	162° 48' W
Beaufort Sea	70° 22' N	146° 01' W

Table 2.3 Scenario Release Locations

2.6.5 Ice in the Region

OilMap treats the interaction with partial sea ice cover as follows:

Ice Cover (%)	Advection	Evaporation	Entrainment	Spreading
0 – 30	No change	No change	No change	No change
30 – 80	35° to right	Linear reduction with ice cover	Linear reduction with ice cover	Terminal thickness increased in proportion to ice coverage

Ice cover data were obtained from Sea Ice Atlas, a joint project funded by the Alaska Ocean Observing System (AOOS), the Alaska Center for Climate Assessment and Policy (ACCAP), and the Scenarios Network for Alaska and Arctic Planning (SNAP). Ice data were entered on a monthly average basis for subareas within each of the two seas modelled.

3 Model Results

Stochastic modelling was developed to simulate surface water trajectories of 100 individual spill releases for each of the three spill scenarios in the two locations of interest (Table 3.1).

Table 3.1 Stochastic Model Scenarios

Spill Scenario	Spill Location	Month	Oil Type	Spill Release Rate (bbl/day)	Spill Release Duration (Days)	Model Duration (Days)
1	Chukchi Sea	August	ANS Crude Oil	35,000*	10	120
2	Chukchi Sea	July	ANS Crude Oil	28,000*	33	150
3	Chukchi Sea	October	ANS Crude Oil	30,000	90	90
4	Beaufort Sea	August	ANS Crude Oil	35,000*	10	120
5	Beaufort Sea	July	ANS Crude Oil	28,000*	33	150
6	Beaufort Sea	October	ANS Crude Oil	30,000	90	90

* Adjusted release rate inclusive of the 20% reduction due to response countermeasures

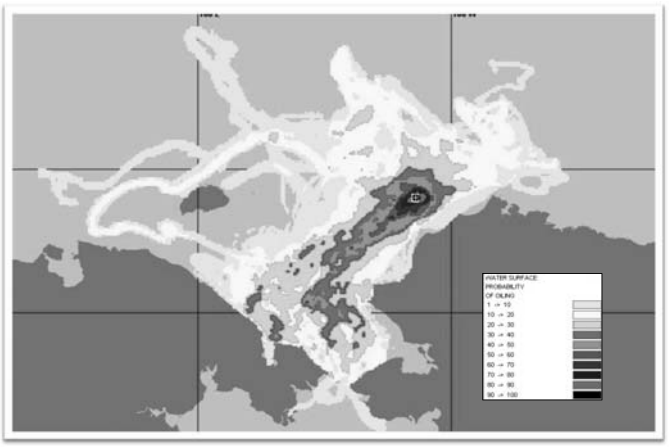
Each individual simulation begins at a time selected randomly for each given month from the 5-year wind record, thus sampling the variability in the local wind and surface current forcing. The sum of each of the 100 spill trajectory simulations defines the expected footprint or reach of the spill in each monthly scenario. This footprint represents the area of water surface and linear shoreline that could reasonably be reached by crude oil in the event of a spill during the length of each scenario. Any of the individual spill trajectory simulations covers only a relatively small area of the overall footprint posed by the combination of all of the scenarios.

The combined individual spill trajectory simulations also provide an indication for the shortest and average crude oil travel time from the origin of the spill to shore, as well as the maximum and average amount of crude oil that contacts the shore, for each stochastic scenario.

The coloured ranges in the Figures depict the range of probability of crude oil spread. For example, the outer edge of the yellow band represents a 10% likelihood of spread while in the inner edge represents a 20% likelihood. The lower end of the lowest (blue) probability range selected for the mapping was 1%. The highest range selected was 90-100%. Also, water surface or shoreline reach potential with a percentage chance occurrence somewhere within the first or last 10% range of probability, or within any of the other percentage ranges selected in the mapping, is not considered in the analysis (i.e., a 2% probability or a 98% probability).

The results of the six model scenarios are shown in Figure 3.1 through Figure 3.6. The figures do not imply that the entire coloured surface area presented would be reached by crude oil in the event of a spill, and do not provide any information on the concentration of crude oil in a given area; it only shows the probability of crude oil reaching a particular area. Each stochastic scenario also includes various spill statistics, including the percentage of scenarios in which crude oil reached the shore.

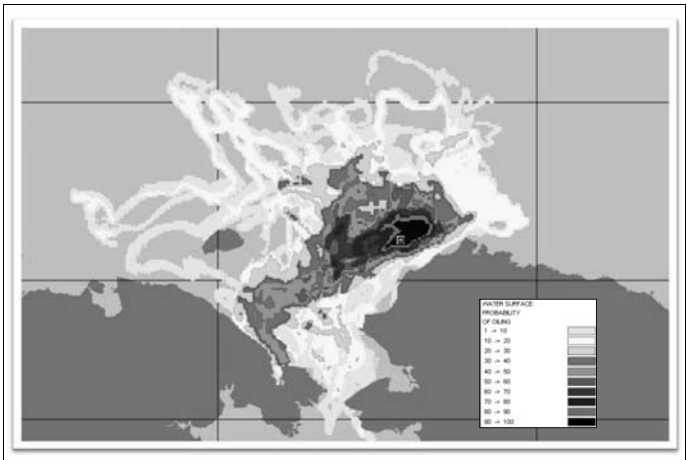
3.1 Scenario 1 - Chukchi Sea 10-Day Release Scenario (August)



Water Surface Probability

Scenario Information		Spill Statistics		Oil Properties	
Start Month	August	% Simulations Ashore	100 %	Name	ANS Crude Oil
Sea Surface Temp (°C)	2	Shortest Time to Shore	48.75 days	Density @ 15 °C (g/cm^3)	0.876
Release Duration	10 days	Average Time to Shore	92. 67 days	Viscosity @ 15 °C (cP)	15
Model Run Duration	120 days	Maximum Oil Ashore	164,679 bbls		
Spill Rate	35,000 Barrels/day	Average Oil Ashore	89,388 bbls		
Spill Site	71° 15' N, 162° 48' W				

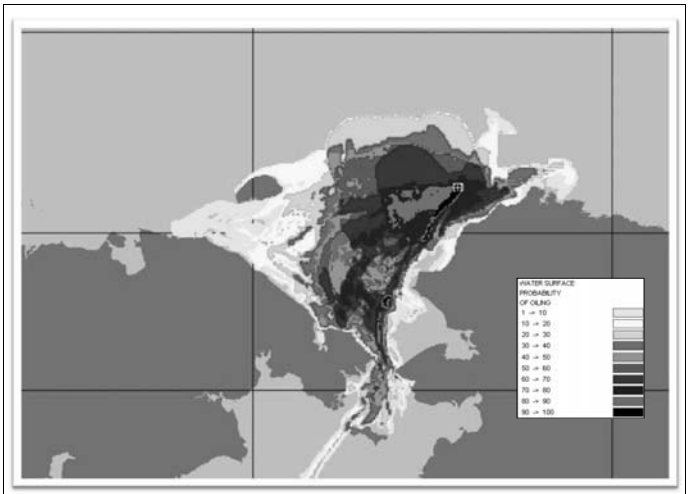
3.2 Scenario 2 - Chukchi Sea 33-Day Release Scenario (July)



Water Surface Probability

Scenario Information		Spill Statistics		Oil Properties	
Start Month	July	% Simulations Ashore	100 %	Name	ANS Crude Oil
Sea Surface Temp (°C)	2	Shortest Time to Shore	38.7 days	Density @ 15 °C (g/cm^3)	0.876
Release Duration	33 days	Average Time to Shore	68.2 days	Viscosity @ 15 °C (cP)	15
Model Run Duration	150 days	Maximum Oil Ashore	266,060 bbls		
Spill Rate	28,000 Barrels/day	Average Oil Ashore	129,665 bbls		
Spill Site	71° 15' N, 162° 48' W				

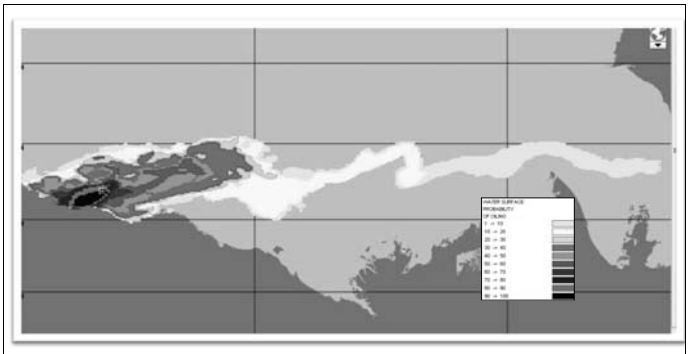
3.3 Scenario 3 - Chukchi Sea Uncontrolled Release Scenario (October)



Water Surface Probability

Scenario Information		Spill Statistics		Oil Properties	
Start Month	October	% Simulations Ashore	100 %	Name	ANS Crude Oil
Sea Surface Temp (°C)	2	Shortest Time to Shore	2.2 days	Density @ 15 °C (g/cm^3)	0.876
Release Duration	120 days	Average Time to Shore	19.4 days	Viscosity @ 15 °C (cP)	15
Model Run Duration	120 days	Maximum Oil Ashore	282,281 bbls		
Spill Rate	30,000 Barrels/day	Average Oil Ashore	174,771 bbls		
Spill Site	71° 15' N, 162° 48' W				

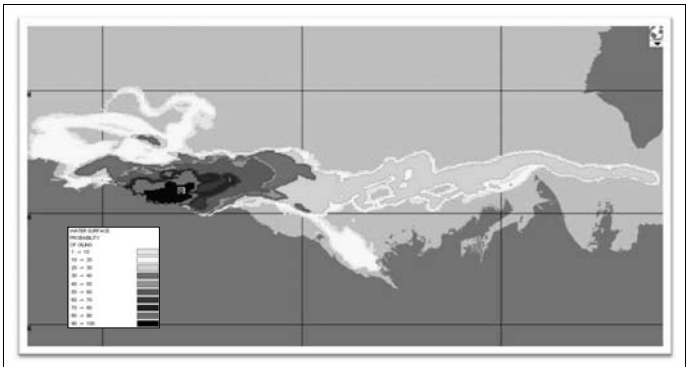
3.4 Scenario 4 - Beaufort Sea 10-Day Release Scenario (August)



Water Surface Probability

Scenario Information		Spill Statistics		Oil Properties	
Start Month	August	% Simulations Ashore	98 %	Name	ANS Crude Oil
Sea Surface Temp (°C)	2	Shortest Time to Shore	0.5 days	Density @ 15 °C (g/cm^3)	0.876
Release Duration	10 days	Average Time to Shore	2.55 days	Viscosity @ 15 °C (cP)	15
Model Run Duration	120 days	Maximum Oil Ashore	145,404 bbls		
Spill Rate	35,000 Barrels/day	Average Oil Ashore	93,253 bbls		
Spill Site	70° 22' N, 146° 01' W				

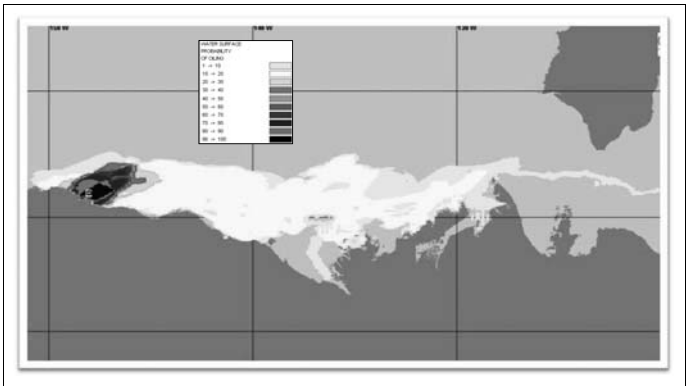
3.5 Scenario 5 - Beaufort Sea 33-Day Release Scenario (July)



Water Surface Probability

Scenario Information		Spill Statistics		Oil Properties	
Start Month	July	% Simulations Ashore	100 %	Name	ANS Crude Oil
Sea Surface Temp (°C)	2	Shortest Time to Shore	0.54 days	Density @ 15 °C (g/cm^3)	0.876
Release Duration	33 days	Average Time to Shore	3.22 days	Viscosity @ 15 °C (cP)	15
Model Run Duration	150 days	Maximum Oil Ashore	318,519 bbls		
Spill Rate	28,000 Barrels/day	Average Oil Ashore	165,609 bbls		
Spill Site	70° 22' N, 146° 01' W				

3.6 Scenario 6 - Beaufort Sea Uncontrolled Release Scenario (October)



Water Surface Probability

Scenario Information		Spill Statistics		Oil Properties	
Start Month	October	% Simulations Ashore	100 %	Name	ANS Crude Oil
Sea Surface Temp (°C)	2	Shortest Time to Shore	0.17 days	Density @ 15 °C (g/cm^3)	0.876
Release Duration	120 days	Average Time to Shore	18.6 days	Viscosity @ 15 °C (cP)	15
Model Run Duration	120 days	Maximum Oil Ashore	408,710 bbls		
Spill Rate	30,000 Barrels/day	Average Oil Ashore	18,290 bbls		
Spill Site	70° 22' N, 146° 01' W				

4 Conclusions

The model output depicted in Section 3 shows the probability of potential spread and impact areas from various crude oil release scenarios in the Chukchi and Beaufort Seas. Wherever possible, the models were based on conservative data (those presented by industry), assumptions, and parameters. As discussed above, all projected trajectories were limited because the model does not factor in oil movement in those specific areas where pack ice cover reaches 80%. In an actual release, continued uncontrollable movement with and under pack ice would likely substantially increase the extent of dispersal through the time of ice break-up in late spring. Additional conservative assumptions applied in various scenarios include:

- The capping of a well in seven days;
- The successful drilling of a relief well in 33 days;
- 20% removal of surface oil using mechanical and alternative response countermeasures.

In the case of the Chukchi Sea scenarios, the average time before oil reached shore varied from 3 months (in the August release scenario) to only around three weeks in the October release scenario. The average amounts of crude oil reaching shore varied from around 90,000 bbls (in the August scenario) to close to 175,000 bbls in the October release scenario. Oil reached shoreline somewhere in 100% of the scenarios modelled.

In the case of the Beaufort Sea scenarios, the average time before oil reached shore varied from 18 days (in the October release scenario) to only 2.5 days in the August release scenario. The average amounts of crude oil reaching shore varied from around 18,000 bbls (in the October scenario) to close to 165,000 bbls in the July release scenario. Oil reached shoreline somewhere in 98% - 100% of the scenarios modelled.

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NOAA Satellite and Information Service, National Environmental Satellite, Data and Information Service (NESDIS)

Appendix A OILMAP

OILMAP is a state-of-the-art, personal computer based oil spill response system applicable to oil spill contingency planning and real time response and applicable for any location in the world (Jayko and Howlett, 1992; Spaulding et al., 1992a,b). OILMAP was designed in a modular fashion so that different types of spill models could be incorporated within the basic system, as well as a suite of sophisticated environmental data management tools, without increasing the complexity of the user interface. The model system employs a Windows based graphics user interface that extensively utilizes point and click and pull down menu operation. OILMAP is configured for operation on standard Pentium PCs and can be run on laptop and notebook computers to facilitate use in the field.

The OILMAP suite includes the following models: a trajectory and fates model for surface and subsurface oil, an oil spill response model, and stochastic and receptor models. The relevant models are described in more detail below.

The trajectory and fates model predicts the transport and weathering of oil from instantaneous or continuous spills. Predictions show the location and concentration of the surface and subsurface oil versus time. The model estimates the temporal variation of the oil's areal coverage, oil thickness, and oil viscosity. The model also predicts the oil mass balance or the amount of oil on the free surface, in the water column, evaporated, on the shore, and outside the study domain versus time. The fate processes in the model include spreading, evaporation, entrainment or natural dispersion, and emulsification. As an option OILMAP can also estimate oil-sediment interaction and associated oil sedimentation. A brief description of each process algorithm is presented here. ASA (1997) provides a more detailed description for the interested reader. The oil sedimentation algorithm is described in French et al. (1994), ASA (1996) and Kirstein et al. (1985). Spreading is represented using the thick slick portion of Mackay et al.'s (1980, 1982) thick-thin approach. Evaporation is based on Mackay's analytic formulation parameterized in terms of evaporative exposure (Mackay et al., 1980, 1982). Entrainment or natural dispersion is modeled using Delvigne and Sweeney's (1988) formulation which explicitly represents oil injection rates into the water column by droplet size. The entrainment coefficient, as a function of oil viscosity, is based on Delvigne and Hulsen (1994). Emulsification of the oil, as function of evaporative losses and changes in water content, is based on Mackay et al. (1980, 1982). Oil-shoreline interaction is modeled based on a simplified version of Reed et al. (1989) which formulates the problem in terms of a shore type dependent holding capacity and exponential removal rate.

For the subsurface component, oil mass injection rates from the surface slick into the water column are performed by oil droplet size class using Delvigne and Sweeney's (1988) entrainment formulation. The subsurface oil concentration field is predicted using a particle based, random walk technique and includes oil droplet rise velocities by size class. The vertical and horizontal dispersion coefficients are specified by the user. Resurfacing of oil droplets due to buoyant effects is explicitly included and generates new surface slicks. If oil is resurfaced in the vicinity of surface spillets the oil is incorporated into the closest surface spillet. A more detailed presentation of the subsurface oil transport and fate algorithm is given in Kolluru et al. (1994).

The basic configuration of the model also includes a variety of graphically based tools that allow the user to specify the spill scenario, animate spill trajectories, currents and winds, import and export environmental data, grid any area within the model operational domain, generate mean and/or tidal current fields, enter and

edit oil types in the oil library, enter and display data into the embedded geographic information system (GIS) and determine resources impacted by the spill.

The GIS allows the user to enter, manipulate, and display point, line, poly line, and polygon data geographically referenced to the spill domain. Each object can be assigned attribute data in the form of text descriptions, numeric fields or external link files.

In the stochastic mode spill simulations are performed stochastically varying the environmental data used to transport the oil. Either winds, currents, or both may be stochastically varied. The multiple trajectories are then used to produce contour maps showing the probability of surface and shoreline oiling. The trajectories are also analyzed to give travel time contours for the spill. These oiling probabilities and travel time contours can be determined for user selected spill durations. If resource information is stored in the GIS database a resource hit calculation can be performed to predict the probability of oiling important resources.

OILMAP has been applied to hindcast a variety of spills. These hindcasts validate the performance of the model. Hindcasts of the *Amoco Cadiz*, Ixtoc and Persian Gulf War spills and an experimental spill in the North Sea by Warren Springs Laboratory are reported in Kolluru et al. (1994). Spaulding et al. (1993) also present a hindcast of the Gulf War spill. Spaulding et al. (1994) present the application of the model to the *Braer* spill where subsurface transport of the oil was critical to understanding the oil's movement and impact on the seabed. Recently Spaulding et al. (1996a) have applied the model to hindcast the surface and subsurface transport and fate of the fuel oil spilled from the *North Cape* barge. Integration of OILMAP with a real time hydrodynamic model and the hindcast of the movement of oil tracking buoys in Narragansett Bay are presented in Spaulding et al (1996b).

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EXHIBIT 2

Kris Weber and Joshua Axelrod, To Disperse, or Not to Disperse: Reviewing the Toxicity of Chemical Oil Dispersants and Implications of Their Use in Arctic Environments (Dec. 2014)

To Disperse, or *Not* to Disperse: Reviewing the Toxicity of Chemical Oil Dispersants and Implications of Their Use in Arctic Environments, *Kris Weber, Joshua Axelrod, December 2014*

I. Introduction

Scientists with the U.S. Geological Survey have estimated that approximately 13% of the world's undiscovered oil reserves are located north of the Arctic Circle, mostly offshore (Gautier et al. 2009). The depletion of more accessible oil reserves has driven companies to increasingly shift their exploration efforts offshore and northward in the hope of accessing new reserves of petroleum and gas (Figure 1). However, a foray into the North's unique, fragile, and largely unexplored resource frontier raises serious environmental and socioeconomic concerns, several of which are explored in this report.

Because marine oil spills pose severe risks of harm to aquatic and terrestrial organisms living in proximity to the affected area, rapid and effective spill response is essential for preventing or minimizing environmental harms. Not only is spilled oil itself an irritant, carcinogen, immunosuppressant, and otherwise general toxin among both wildlife and humans, but various cleanup techniques may also lead to a variety of harmful impacts as well. This report focuses specifically on research gaps and the concerns they raise surrounding the use of chemical oil dispersants, focusing on their effectiveness and toxicity in "Arctic conditions."

The explosion of BP's Deepwater Horizon rig in 2010 sparked an influx of questions about the safety of applying chemical dispersants to marine oil spills. Dispersants are detergent-like substances that, upon application to an oil slick, separate spilled oil into smaller particles and thereby promote its movement deeper into the water column and away from the water's surface. In principle, this serves to enhance the rate of microbial degradation of spilled oil in seawater. BP's massive application of dispersants in the wake of the Deepwater Horizon disaster, however, drew criticism in light of previous research linking dispersant usage to a variety of adverse impacts to marine species.

Now, with the oil industry contemplating exploration activity in the Arctic region, major gaps in research about the toxicity of oil dispersants, or even their effectiveness, to Arctic conditions and species remain. Previous research has indicated the vastly different environmental and biological parameters that distinguish Arctic biomes from temperate biomes, from average seasonal temperature and day length to water salinity and rates of biological metabolism. If these factors have any effect whatsoever on the behavior of oil dispersants and their overall ecological impacts, then the existing research may be entirely insufficient for evaluating the benefits and costs of chemical dispersant use in Arctic conditions.

"Arctic conditions" are typically understood to refer to water temperatures at or below freezing, limited daylight hours, relatively low water salinities, and the presence of ice cover for much of the year (Brandvik et al 1993). Many species living in this biome have evolved adaptations to thrive in such harsh conditions, including slower metabolic rates, reduced energy use, high lipid reservoirs, relatively large surface area to volume ratios in body sizing, and longer development times. Together, these adaptations may or may not result in differential responses to the presence of waterborne contaminants as compared with temperate species. Furthermore, to accommodate the seasonal fluctuations in ice cover, ocean salinity, and daylight that characterize polar biomes, many of these biologic and behavioral characteristics of Arctic species may vary throughout the year. Whether these physiological fluctuations affect the sensitivity of polar species to waterborne toxins is unknown, and remains an important area for future research.

As the oil and gas industry looks to explore increasingly peripheral regions of the globe, it is crucial that all stakeholders understand the true potential for environmental and socioeconomic harm posed by the current repertoire of oil spill countermeasures. In this report, we perform a critical analysis of the existing research concerning oil dispersant effectiveness and toxicity in general, highlighting areas where Arctic conditions may contribute to unexpected or different outcomes. We then consider the possible consequences for Arctic species and ecosystems if dispersant were used on oil spills in the region. We conclude by identifying areas in which greater study of dispersants is needed, positioning each issue within the context of existing research.

II. Existing Knowledge

Before presenting exploring possible implications of exposure to chemically dispersed oil to Arctic species, it is necessary to first discuss the general characteristics of oil dispersants, and then to examine the ways in which oil behavior in the Arctic differs from oil behavior in warmer regions, as well as the physiological ways in which Arctic species tend to differ from their temperate and tropical counterparts.

a. Oil Dispersants

i. Effectiveness

There exists a large pool of evidence linking spilled oil to detrimental health conditions in nearby aquatic and terrestrial species (Incardona et al. 2009). Prompt removal of oil from waterways is thus a primary goal among local communities and cleanup personnel in the aftermath of an oil spill. However, several common remediation techniques have generated concern among the scientific community due to their potential impacts on nearby organisms. One of the most controversial techniques involves the application of chemical dispersants to a surface oil slick or to a subsurface leaking wellhead.

Chemical oil dispersants are amphipathic surfactants—bipolar molecules containing both hydrophilic and lipophilic ends—that act in a manner similar to household soaps and detergents. When poured onto an oil slick, the dispersant forms a water-accommodated "micelle" around oil particles, with the hydrophilic heads of the molecules facing the open water, and the lipophilic tails facing the surrounded oil particle (Figure 2). This interaction between dispersant and spilled oil creates smaller particles of dispersed oil, that more easily sink below the water's surface and spread throughout the water column. Ideally, this dispersion below the surface increases the oil droplets' susceptibility to biodegradation.

The "effectiveness" of a chemical dispersant is thus determined by how much oil is dispersed into the water column, compared to the amount that remains on the surface of the water (Fingas 2003b, Fingas 2008). Thus, an effective dispersant does not actually *remove* oil from the water, but rather achieves a rapid rate of dispersion from the water surface to the water column. Ideally, this dispersed oil is then rapidly broken down into a non-toxic (or less-toxic) state through weathering and bacterial degradation (Mielbrecht et al. 2005).

However, the long term fate of dispersants and dispersed oil in the water column is poorly understood, especially when dispersants are injected in deep water directly at the well head as they were during the Macondo spill (Kujawinski et al, 2011). Described by some as an "out of sight, out of mind" remediation technique, chemical oil dispersants might better be characterized as a tool requiring rigorous consideration of the tradeoffs between surface and subsurface impacts. In the Arctic environment, balancing this tradeoff may be particularly challenging, as any measure impacting benthic and pelagic

zones could potentially devastate the Arctic ecosystem by harming a critical link in the Arctic food chain (a scenario considered in greater detail below). Recent findings regarding the fate of dispersed oil from the Macondo well disaster highlight just how grave this threat may be if translated to the Arctic environment (Valentine, 2014).

In addition, the effectiveness of dispersants in cold water and Arctic environments remains an area of major uncertainty and dispute in the research (Fingas 2008). Numerous studies conducted in simulated cold water and cold water and ice conditions – as well as literature reviews compiling this work – have attempted to settle this dispute with little success. Though the reasons for this uncertainty are examined in greater depth below, the basic conditions required for effective dispersant help to illustrate the many real world factors that are necessary for effective dispersion of spilled oil:

1. "The dispersant must hit the target oil at the desired dosage.
2. The surfactant molecules in the dispersant must have time to penetrate and mix into the oil.
3. The surfactant molecules must orient at the oil-water interface with the hydrophilic groups in the water phase and the lipophilic groups in the oil phase.
4. The oil-water interfacial tension must decrease due to the presence of the surfactant molecules at the oil-water interface, thereby weakening the cohesive strength of the oil film.
5. Sufficient mixing energy must be applied at the oil-water interface [. . .] to allow generation of smaller oil droplets [. . .].
6. The droplets must be dispersed throughout the water column by a combination of diffusive and advective processes to minimize droplet collisions and coalescence to form larger droplets (which can resurface in the absence of continued turbulence).
7. After entrainment, the droplets must be diluted to nontoxic concentrations and remain suspended in the water column long enough for the majority of the oil to be biodegraded" [NAS, 2006]

Lewis & Daling Reviewed studies conducted under "arctic conditions" from 1979-2006 (2007). Similar to the conclusions reached by others, this review showed significant variability in testing methods – including scale, type of oil, temperatures of waters, etc. – which resulted in an unsurprising variability in results from high to low dispersibility. The common themes from this 2007 review are echoed in more recent studies, which similarly failed to reach any consensus on effectiveness in Arctic conditions. Brandvik & Faksness found that low temperatures and certain ice conditions may increase potential effectiveness of in situ burning and dispersant application (2009). However, the same benefits of cold water examined by Brandvik & Faksness (increased viscosity and minimal spreading), can seriously decrease dispersant effectiveness (Trudel et al, 2010). Similarly confounding results, observed under temperate or Arctic conditions, show that both high salinity waters (30-50 psu) and low salinity waters (20 psu and below) lead to ineffectiveness of chemical dispersants (Tansel et al, 2014; Lindgren, 2001). Testing funded by the U.S. government has resulted in uncharacteristically definite findings of near-complete effectiveness under Arctic conditions (SL Ross, 2007; SL Ross 2003), though few others reach similar conclusions (Brandvik et al, 2006). The issues raised by these studies – temperature, salinity, wave energy, and ice – are examined in greater, detail below. More importantly, real world results have been decidedly less impressive than those achieved under controlled study: during the Exxon-Valdez spill, use of chemical dispersants resulted in "little to no effectiveness" (Fingas 2008).

ii. Toxicity

The use of chemical dispersants on spilled oil has generated a substantial degree of concern among the scientific community, especially in the wake of the 2010 Macondo well disaster in the Gulf of Mexico, where surface and sub-surface application of the Corexit 9527 and 9500 dispersants totaled close to 2 million gallons (Rico-Martínez et al 2013; Wise 2011). Prior to modern dispersant formulations – which have been designed to use a "less toxic solvent" – dispersants were blamed for significant harmful impacts to sea life (Rico-Martinez et al 2013). Today, the harmfulness of modern formulations is less certain, though significant debate persists, especially as extraordinary volumes of dispersants are used and questions about impacts of oil-dispersant mixtures remain unanswered (Adams 2014). At the outset, it should be noted that very few studies have focused on dispersant toxicity under Arctic conditions and to Arctic species, an ongoing serious gap in the existing research.

In 2011, Wise conducted a review of all existing peer reviewed literature on dispersant toxicity to clarify the state of the debate in the wake of the Macondo disaster (Wise 2011). The review, which covered 39 studies conducted between the 1970s and 2010, found significant variability in toxicity depending on both the dispersant applied and the species being tested (Ibid.). At the same time, it noted that major gaps in toxicity research remain, including impacts to "large predatory fish, marine mammals, marine birds, and humans," and that "variability in test methods, and lack of species overlap" are contributing to lack of scientific consensus on this issue (Ibid.). Since Wise's review in 2011, at least 34 new studies have examined the dispersant toxicity issue and will be briefly summarized below.

Adams et al examined the toxicity to fish embryos of dissolved Medium South American crude, heavy fuel oil, and a nontoxic mineral oil in water and dispersant treated oil in water (2014). Though this study finds no increased toxicity due to the interaction of oil and dispersants (compared to dissolved oil alone), it notes that dispersion of oil into the water column dramatically increases the exposure of sub-surface species to toxic chemicals present in oil (Ibid.).

Almeda et al focused on the toxicity of dissolved Louisiana light sweet crude on gelatinous zooplankton (2013). Though toxicity of dispersant treated oil was not a primary focus of this study, it emphasizes an issue with chemically dispersed oil that must be resolved in the research, namely whether chemically dispersed oil creates "food size" droplets that can be ingested by zooplankton, leading to toxic exposure and/or bioaccumulation of PAHs and other crude oil components higher up the good chain.

In two 2014 studies, Almeda et al examined the toxicity of the dispersant Corexit 9500A mixed with Louisiana lights sweet crude on microzooplankton and planktonic copepods (Almeda et al 2014, Almeda et al 2014a). In the first study, researchers considered the likelihood that three marine copepods could ingest either physically or chemically dispersed crude oil following a marine spill and the relative toxicity of such ingestion (Almeda et al 2014). Ingestion of crude oil and ingestion of Corexit 9500A proved to be similarly toxic to the tested species while ingestion of chemically dispersed oil was approximately 1.6 times more toxic than crude oil alone (Ibid.). In the second, similar study, researchers considered these same impacts on three species of microzooplankton (Almeda et al 2014a). Ingestion of crude oil and ingestion of Corexit 9500A proved to have varying toxicities among the tested species, though chemically dispersed oil was once again found to be more toxic than either oil or dispersant alone (Ibid.). Both studies suggest additional research to clarify the impact of dissolved hydrocarbon components, especially low-solubility PAHs, entering the water column after treatment of spilled oil.

Anderson et al focused on the toxicity of the dispersant Corexit 9500 mixed with Prudhoe Bay Crude Oil to embryos of topsmelt (Anderson et al 2009). Though the study found that chemically dispersed oil resulted in significantly greater hydrocarbon concentrations in the water column and significant negative impacts to topsmelt larvae compared to physically dispersed oil, the authors suggest that the controlled nature of their method may have led to overestimation of toxicity (Ibid.).

Anderson et al considered the immunotoxicity of diocytl sodium sulfosuccinate (DSS), a key component of the dispersant Corexit 9500A, following its use on the Macondo well disaster in 2010 (Anderson 2011). While the study did not find that exposure caused an immunosuppressive response, allergic hypersensitivity after contact with skin was noted, as was the strong potential for eye and lung irritation (Ibid.)

Anderson et al studied the acute toxicity of Louisiana sweet crude along with chemically dispersed on juvenile Harris mud crabs, a benthic crustacean (2014). Chemically dispersed crude oil (using Corexit 9500) was determined to far more acutely toxic than physically dispersed oil (and also contained much higher levels of dissolved PAHs), though surviving initial exposure did not appear to cause long-term harmful impacts (Ibid.).

Anderson-Lively & McKenzie considered the acute toxicity of the dispersant Corexit 9500A alone on juvenile and larval blue crabs, a species directly impacted by the Macondo well disaster in 2010 (2014). While direct application of the dispersant led to higher rates of mortality among studied samples, realistic dilution in water did not lead to significant increases in mortality (Ibid.).

Chakraborty et al studied the microbial response to the dispersant Corexit 9500 and the crude oil MC-252, which was released during the Macondo well disaster in 2010 (2012). They found that certain indigenous microbes successfully mineralized released oil, bloomed as hydrocarbons became available as substrates, and were further aided by the addition of dispersant, which increased the success of microbial degradation (Ibid.).

Claireaux et al studied the response of European sea bass to the dispersant Finasol, weathered Arabian light crude oil, and chemically dispersed oil in field-simulated test conditions (2013). Results showed that fish exposed to physically and chemically dispersed oil experienced lower growth rates, while lower survival rates were also noted for specimens exposed to the chemically dispersed oil (Ibid.).

Delshad et al studied the toxicity of the dispersants Naftroob and Radiagreen alone and in combination with Persian Gulf-Khark crude oil on a species of benthic shrimp (2014). Not only were both dispersants more toxic than the oil itself, but the chemically dispersed oil was also found to be quite toxic (Ibid.).

Gardiner et al considered the acute toxicity of the dispersant Corexit 9500 and Alaskan North Slope crude oil alone and in combination on three key Arctic species present in the Chukchi and Beaufort Seas (2013). They found that chemically dispersed oil led to higher concentrations of total petroleum hydrocarbons in the water column compared to physically dispersed oil, but that in either case, the acute toxicity of each mixture was similar and the dispersant did not appear to be contributing to the impacts observed (Ibid.).

Goodbody-Gringley et al studied the acute toxicity of the dispersant Corexit 9500 and Deepwater Horizon crude oil on two species of coral larvae (2013). Results indicated that while physically dispersed crude oil had serious negative impacts, chemically dispersed oil and dispersant alone were far more acutely toxic to the studied species than the oil alone (Ibid.).

Hansen et al considered the toxicity of the dispersant Dasic NS and North Sea Troll crude oil independently and combined on a filter-feeding copepod (2012). The study found that the addition of dispersant to oil increased its toxicity "at median and low effect levels," but reduced it at "high effect levels" (as compared to physically dispersed oil) (Ibid.).

Hemmer et al studied the toxicity of eight different dispersants, including Corexit 9500, and Louisiana sweet crude oil on two Gulf species (2011). The crude oil was tested alone and in mixtures with the dispersants (Ibid.). For one species, the chemically dispersed oil was found moderately toxic to mysid shrimp in mixtures with seven of the dispersants (including Corexit 9500) and moderately toxic to inland silverside with five of the dispersants (including Corexit 9500) (Ibid.). Physically dispersed versus chemically dispersed oil was generally found to be similarly toxic to the species considered (Ibid.).

Hook & Osborn considered the toxicity of the dispersant Slickgone NS and Bass Strait crude oil, independently and mixed, to a diatom (2012). Physically dispersed oil was found to far less toxic than the dispersant alone, which was, in turn, less toxic than the chemically dispersed oil (Ibid.).

Jung et al studied the toxicity of the dispersant Hi-Clean and Iranian heavy crude oil, independently and mixed, on plankton species in South Korea (2012). Physically dispersed oil was found to cause fewer impacts to the planktonic ecosystem than either dispersant or chemically dispersed oil (Ibid.).

Kuhl et al considered the impact of salinity and dispersant use (Corexit 9500A) on the toxicity of South Louisiana crude oil on a species of estuarine fish (2013). Under all scenarios, use of dispersant increased the presence of PAHs in the water column, while lowering salinity corresponded to an increased period of toxicity for both dispersant/water and dispersant/oil mixtures (Ibid.). Chemically dispersed oil was more toxic than either the dispersant or the oil at the lowest salinities studied (Ibid.).

Lee et all studied the acute and chronic toxicity of the dispersants Corexit 9500 and Hiclean and Iranian heavy crude oil, independently and mixed, on a species of copepod (2013). They found that Corexit 9500 alone was the most toxic chemical tested, leading to greater impacts that either physically or chemically dispersed oil (though both mixtures were also found to be toxic) (Ibid.).

Lee et all considered the toxicity of the dispersant Corexit 9500 and Alaska North Slope crude oil on several large species of fish indigenous to Alaskan waters (2013). Though chemically dispersed oil was found to impact cod eggs and larvae as well as Atlantic salmon, they note that for a lethal impact, concentrations of the dispersed mixture would need to be quite high (Ibid.).

Lewis & Pryor reviewed the literature relating to the phyotoxicity of dispersants and crude oil on algae and aquatic plants (2013). In general, they note that the literature has only considered a

small subset of aquatic species and that a more strategic approach is needed to fill critical missing data gaps (Ibid.).

Lyons et al considered the toxicity of physically and chemically dispersed (using Corexit 9500) Mediterranean South American crude oil to juvenile Atlantic cod in a variety of water temperatures (2011). Both physically and chemically dispersed oil elevated liver ethoxyresorufin O-deethylase (EROD) activity in tested species, while water temperature appeared to play a significant role as well, with cold water tests showing a delayed response to toxins in specimens (Ibid.).

Milinkovitch et al studied the toxicity of two dispersants (manufactured by Total Fluides and Innospech) and Brut Arabian Light crude oil, independently and mixed, on a juvenile fish species (2011). Fish subjected to chemically dispersed oil were found to have higher concentrations of PAHs and experienced higher mortality rates than fish exposed to physically dispersed oil or to soluble fractions of oil (Ibid.).

Ortmann et al considered the impacts of chemically dispersed oil (using Corexit 9500A) on the surface microbial community in the Gulf of Mexico, considering specifically how possible disruption of this important piece of the Gulf food chain might impact higher trophic levels (2012). Dispersed oil was found to increase biomass of heterotrophic prokaryotes, but inhibit growth of ciliates, an outcome that could have serious impacts on species higher up the food chain (Ibid.).

Ozhan & Bargu studied the response of phytoplankton communities to South Louisiana Sweet crude oil, the dispersant Corexit 9500A, and chemically dispersed oil to determine how these substances impacted community structures (2014). They found that sensitive species declined, while resistant species increased after exposure to the contaminants tested, but that chemically dispersed oil increased the toxicity of the crude oil on species examined (Ibid.). In a similar study, Ozhan et al considered the growth response of five phytoplankton species to South Louisiana sweet crude oil that was physically and chemically dispersed (with Corexit 9500A) (2014a). They found that impacts varied based on total petroleum hydrocarbon concentrations and that toxicity potential appeared to be largely tied to levels of PAHs in the water column (Ibid.). Addition of dispersant led to a 50-fold increase in the presence of crude oil in the water column, suggesting increased toxicity potential (Ibid.).

Polli et al considered the mechanism by which chemically dispersed oil (using Corexit 9500A) leads to germ cell apoptosis on species of roundworm (2014). Apoptotic germ cells increased after exposure to all tested concentrations of chemically dispersed oil (Ibid.).

Rial et al studied the toxicity of Maya crude oil and the dispersants CytoSol, Finasol OSR51, Agma OSD569, and Agma OD4000 on sea urchin embryos (2014). A range of toxicity was noted depending on the dispersant used, with chemically dispersed oil using Finasol OSR51 showing the greatest toxicity to species studied (Ibid.).

Rico-Martinez et al considered whether there was a synergistic toxic effect to a species of marine rotifer when Macondo crude oil and the dispersant Corexit 9500A were mixed (2013). They found that while the crude oil and the dispersant alone were similarly toxic, the chemically

dispersed oil increased toxicity by 52-fold (Ibid.). However, Coehlo et al criticize the conclusions and attack the methodology of the Rico-Martinez study (2013).

Wise et al studied the cyto- and genotoxicity of Corexit 9500 and 9527 at various concentrations to sperm whale skin cells (2014). Both dispersants were found to be cytotoxic to sperm whale skin fibroblasts, though 9527 was less so than 9500 (Ibid.). Both dispersants were genotoxic to the skin fibroblasts (Ibid.).

Wu et al considered the comparative toxicity of four different crude oils (ranging from light to heavy) that were chemically dispersed using Corext 9500 to rainbow trout embryos (2012). Their results showed that chemically dispersed oil dramatically increased toxicity as compared to physically dispersed oil, with toxicity increasing as the oil became less dispersible (i.e., heavier) (Ibid.).

Zheng et al examined the cytotoxic effects of Corexit 9500 (alone) on a variety of mammalian cells (2014). Their findings suggest that Corexit exposure could lead to cytotoxicity in mammalian cells that could contribute to cell death (Ibid.).

Zuijdgeest & Huettel studied the impact the dispersant Corexit 9500A had on the mobility of potentially toxic PAHs contained in chemically dispersed MC-252 crude oil into sediments in the Gulf of Mexico (2012). They found that the dispersant significantly increased the mobility of PAHs into certain sediments, an outcome that could lead to slow degradation of these compounds and long term environmental contamination (Ibid.).

Though not summarized here in the interest of space and reliance on the most recent scientific literature, at least seven studies published between 2000 and 2010 examined toxicity of chemical dispersants and chemically dispersed oil and were not covered by Wise in his 2011 literature review. These include: George-Ares & Clark (low to moderate toxicity of Corexit dispersants alone) (2000); Khan & Payne (varying impacts of crude oil, Corexit 9527, and chemically dispersed oil on larger fish species) (2005); Koyama & Kakuno (oil and chemically dispersed oil more toxic than dispersant alone) (2004); Perkins et al (comparing toxicity testing protocol efficacy in cold and warm water) (2005); Ramachandran et al (low salinity increased potential toxicity of chemically dispersed oil) (2006); Shafir et al (dispersants deployed at recommended concentrations highly toxic to coral species, and chemically dispersed oil and dispersants both more toxic than physically dispersed oil) (2007); Wolfe et al (Corexit 9527 dispersed oil did not significantly impact biotransformation of naphthalene in larval topsmelt) (2001).

As the above review demonstrates, the pool of literature concerning the health effects of chemical dispersants and chemically dispersed oil has grown significantly since the Macondo well disaster in 2010. This literature, while not in complete agreement, appears to support the assertion that oil, dispersant, and dispersed oil are all toxic to marine organisms, with toxicity increasing following chemical dispersion. The reasons for this increase in toxicity appear to be largely unsettled, and indicate a serious gap in the research that must be filled. In addition, many of the gaps in research identified by Wise in 2011 remain unfilled, with most research continuing to focus on planktonic species, microbial communities, or impacts to species at larval stages of development. While critically important, questions regarding direct impacts to larger aquatic species and mammals are pressing, as are questions regarding the possible short and long term impacts of biomagnification.

Since PAHs are the most toxic components of crude oil, any increase in their concentration in aquatic environments could lead to a significantly higher incidence of lethal and sub-lethal effects among exposed marine communities. This possibility is noted continually in the literature, though there appears to be significant disagreement about the role dissolved PAHs are actually playing where increased toxicity to species in the presence of physically versus chemically dispersed oil is noted. Given the toxicity of these hydrocarbon components and the success of dispersants in moving them into the water column, understanding the fate and impacts of PAHs to marine ecosystems appears to be a pressing research priority.

The EPA's release in 2010 of full ingredient lists for the dispersants used in the Macondo well disaster allowed scientists to narrow their research and focus upon individual ingredients that are most concerning. Though research on impacts of some of these ingredients has begun to appear, there continues to be a notable lack of full consideration. This is particularly concerning for first responders. A report published in 2011 by Earthjustice and Toxipedia found that, among 57 ingredients permitted for use in dispersant mixtures,

5 are associated with cancer;
33 are linked to various degrees of skin irritation;
33 are associated with eye irritation;
11 are associated with respiratory tract irritation;
10 may act as kidney toxins (Table 1, Earthjustice & Toxipedia 2011).

For example, 2-butoxyethanol, one of the main chemical ingredients of Corexit 9527®, is of particular concern. The substance generated controversy after being linked to many of the debilitating health effects seen in workers following the 1989 Exxon Valdez oil spill off the coast of Alaska (Schor 2010). Research performed in the wake of the Macondo well disaster found blood concentrations of the chemical reaching 10 parts per million (ppm) in 15% of coastal responders and in 20% of offshore workers involved in spill cleanup (Ibid.). Long term health monitoring of these affected individuals will be essential for researchers to develop a better understanding of the implications of exposure to dispersed oil for human health, as the National Institute for Occupational Safety and Health's (NIOSH) recommended limit for 2-butoxyethanol exposure is 5 parts per million (Ibid.).

b. Oil Behavior

As briefly mentioned above, many of the characteristic features of Arctic environments—low water temperatures, presence of ice cover, and relatively low water salinity—have been shown to influence the behavior of physically and chemically dispersed oil. It is important to note, however, that the majority of studies examining the issue have occurred in the laboratory under controlled conditions. Few conclusive studies assessing the possible additive or synergistic effects of these characteristics in the field have been performed. This lack of research makes it difficult to extrapolate these findings to more realistic spill scenarios. What follows is a discussion highlighting some of the research covering this issue. This summary is not meant to be comprehensive, as this issue is currently under intense scrutiny by regulators and the scientific community. Instead, it seeks to highlight the need for greater clarity regarding the interplay of a variety of Arctic conditions on oil behavior and dispersant effectiveness.

i. Temperature

Numerous studies have demonstrated that the viscosity of oil in water increases as temperatures decrease (Figure 4). This may be a critical factor when considering whether application of chemical dispersants to an Arctic spill is appropriate, as numerous studies have show that dispersant effectiveness declines significantly as temperatures drop (due to increased oil viscosity, among other factors) (Fingas 2008, Lewis & Daling 2007; Moles et al 2002). This is because it is more difficult for chemical dispersants to separate and form micelles around oil particles from the slick as oil thickens (Lyons et. al. 2011). At the same time, the spilled oil's chemical composition will play a major role in its dispersibility to begin with, requiring careful consideration of ambient air and water temperatures, oil composition, and spill duration (Environment Canada 2013).

Others, however, have found temperature to be a factor of less importance. McFarlin et al found that biodegradation of physically and chemically dispersed oil occurred at similar rates under Arctic conditions (-1° C water temperature) as compared to more temperate conditions (2014). As briefly discussed above, studies conducted for the U.S. Bureau of Safety and Environmental Enforcement (BSEE) by SL Ross—in BSEE's OHMSET wave tank—have also achieved high rates of dispersant effectiveness in cold water conditions (2003, 2007; Mullins et al 2008), though results obtained in 2007 were frequently noted with air and water temperatures above 0° C (2007).

Additional concerns raised by oil spills in cold water and at low temperatures center on the potential for increased levels of pollution persisting in the environment. The solubility of many of the volatile hydrocarbon components of crude oil (i.e. benzene, toluene, and hexane) has been shown to increase in cold water (Perkins et al 2005; Lindstrom 2002). This behavior is in accordance with a fundamental principle of chemistry: the lower the temperature, the lower the kinetic energy of a gas and, consequently, the greater its solubility. The presence of ice cover further adds to this effect by physically blocking these lighter-weight particles from evaporating into the ambient air (Lewis & Daling 2007). At the same time, these factors also slow the oil's weathering process, creating the potential for a greater window of time for spill countermeasures, including application of dispersants (Brandvik 2009, Lewis & Daling 2007). What is unclear from these observations is whether this would require—or lead to—application of greater volumes of dispersant, or simply give first responders more time to arrive on the scene of a spill.

ii. Ice Cover and Wave Energy

The effect of ice cover on the movement of water—and, by extension, on the movement of oil particles themselves—is just as significant as its effect on oil weathering, but much more complex. While ice floes dampen the amplitude of waves traveling in from the open ocean and can reduce the degree of disturbance that reaches spilled oil in the process, they also contribute "mixing energy" of their own by bobbing up and down in response to these dampened waves (Lewis & Daling 2007). Whether these contradicting motions ultimately produce waves of greater or lesser amplitude than the original—and thus more potential mixing energy—depends largely on the qualities of the ice in question and remains an open question in the research (Ibid.; Brandvik 2009). Though salinity is discussed in more detail below, the presence of ice—and the melting of ice—has been shown to impact surface water salinity, adding an additional layer of complexity to the issue (Lewis & Daling 2007).

iii. Water Salinity

It is well-established that the circumpolar Arctic has a lower salinity as compared to more temperate oceans to the south. On average, temperate ocean salinity is typically near 35 psu (practical salinity

units), while the Arctic ocean's is often below 30 psu (Lewis & Daling, 2007; Weingartner & Danielson 2010; Weingartner et al 2013). Where large volumes of freshwater enter the Arctic Ocean, salinities are even lower, with near-surface salinities measured at 10 psu in areas near the mouths of the Mackenzie River in Canada and large rivers in Russia (AMAP, 1998; Lewis & Daling; Hopky et al, 1988, Table A1.2). However, this data may suffer from inaccuracies due to an historic lack of monitoring in the field (Steele et al 2000). With climate change, evidence of increased freshwater inputs into the Arctic basin is now appearing, suggesting that salinities throughout the region could decrease over time (Fichot et al 2013).

The issue of salinity is often tied to the effectiveness of chemical oil dispersants, with many studies finding that dispersants have peak effectiveness at salinities ranging from 20 psu to 40 psu, and that effectiveness declines proportionally on either side of this peak (i.e., in low salinity waters and in high salinity waters) (Fingas, 2004; Word 2008). Other studies recognizing this connection between salinity and dispersant effectiveness have recommended that dispersants not be used at all for waters with salinities below 20 psu (Lindgren et al, 2001). For the Corexit dispersants (9500 and 9527), studies have noted effectiveness across a wide range of salinities, though effectiveness is best above 25 psu (Blondina 1999). If such a finding is correct this suggests that there are large areas in the Arctic where surface application of existing chemical dispersants would be ineffective and should not be relied upon. Further, as mentioned in several of the studies summarized above, decreasing salinity was found to facilitate greater absorption of PAHs into the water column, leading to longer periods of potential exposure for marine organisms (Kuhl et al 2013; Ramachandran et al 2006). Though recent research has suggested that dispersants could be reformulated for use in freshwater (or low-salinity water) (Wrenn et al 2009), it is unclear whether this would mean that existing stockpiles would remain unused and whether new formulations would lead to toxicity issues different than those explored above.

c. Anatomical, Biological, and Physiological Adaptations of Arctic Species

In addition to their effects on oil and dispersant behaviors, many of the aforementioned characteristics of Arctic environments—low water temperatures and salinity levels, large fluctuations in daylight hours throughout the year, and the presence of ice cover—have led to numerous physiological and behavioral adaptations in native species (Figure 6). Whether these adaptations correspond to different levels of toxin susceptibility between Arctic and temperate species is an important issue to address.

One significant difference between organisms living in polar regions and those living in lower latitudes is the average rate of metabolism. Whether the species in question is a mammal, a fish, or a bacterium, metabolic rates are almost always lower when environmental conditions are colder—an adaptation used to conserve energy in harsh environments (Lyons et al 2011). In the context of this issue, lower metabolic rates may lead to decreases in the rates of energy uptake, toxin accumulation, detoxification, and depuration (Word & Pinza 2008).

Another biological adaptation that has the potential to impact toxin sensitivity and response in Arctic organisms involves the ratio of bodily surface area to volume (De Hoop et al 2011). Low surface-to-volume ratios, which often manifest in "gigantism" among Arctic species, have been demonstrated to lead to decreased rates of toxin bioaccumulation in aquatic organisms (Chapman & Riddle 2005; De Hoop et al 2011; Wang & Zauke 2003). Thus, characteristic gigantism among Arctic species may result in a decreased sensitivity to toxins such as dispersed oil and its hydrocarbon components. However, as gigantism has *also* been associated with decreased rates of elimination in Arctic species, these two effects may negate each other to yield a sensitivity that is, ultimately, similar to that of temperate organisms (De Hoop et al 2011). Further study is needed in order to specify the degree to which a polar

organism's rate of toxin accumulation is affected by these processes, to elucidate whether or not this conclusion is accurate.

A third adaptation involves the elevated levels of polyunsaturated fatty acids (PUFAs) in the bloodstreams of many Arctic organisms. Increased presence of PUFAs is a cold-weather adaptation found in numerous species living in northern latitudes, serving to prevent the blood from freezing in temperatures below 0°C (De Hoop et al 2011). It is important to note that PUFAs are known to enhance the cellular release of reactive oxygen species (ROS) under conditions of environmental stress (Wilk et al 2013). Environmental stress may entail conditions of abnormal temperature and salinity, or exposure to environmental contaminants (such as the hydrocarbon components of crude oil) (Wilk et al 2013). Thus, exposure to crude oil—and especially chemically dispersed oil, given that dispersants significantly increase the concentration of PAH components in the water column—in Arctic species may lead to an enhanced production of ROS than would be generated in a similar situation in more temperate waters (De Hoop et al 2011; Ozhan et al 2014). However, as Arctic organisms also tend to display elevated levels of ROS-fighting antioxidants (such as vitamins A, C, and E), the ultimate effect of increased ROS levels is subject to uncertainty (De Hoop et al. 2011) and requires further study.

Despite displaying significant differences in biological and physiological adaptations to their respective climates, there appears to be general agreement among researchers that Arctic and temperate species possess similar sensitivities to chemically and physically dispersed oil by-products and other toxins (De Hoop et al. 2011; Olsen et al. 2011; McFarlin et al. 2014; Rice et al. 1976). Significant research already exists linking dispersed oil exposure to significant adverse health effects in temperate species (summarized above), which should spell concern for Arctic species as well.

d. Arctic Food Chains

Due to harsh environmental conditions, Arctic biomes are characterized by lesser degrees of species diversity than are typically seen in lower-latitude, temperate biomes (Slater Museum). The wide variety of species in temperate ecosystems contributes to numerous ecological niches and trophic levels within the region's food webs, affording them a high degree of stability. However, owing to their lower degree of species diversity, Arctic ecosystems are characterized by relatively short and simple food chains—for example, "phytoplankton-zooplankton-fish-seal-polar bear, or phytoplankton-zooplankton-whale" (Chapman & Riddle 2005; Harner 1997). Such ecological simplicity poses a problem—according to Deborah Bronk, a biological oceanographer at the College of William & Mary, "[i]n these very simple food chains, if you lose one species[,] you can really mess up the whole thing" (qtd. in Barcott 2011).

Sterner et al concur, arguing that resilience of a food chain is directly proportional to its length (1997). The concept of "functional redundancy"—the ability of different species to occupy similar ecological niches within a given ecosystem—is a key element of the arguments given here (Chapman & Riddle 2005; Rosenfeld 2002). The longer and more complex the food chain, the more resilient it is to any sort of environmental stressor. If only one or two species occupy a particular niche in a relatively simple food chain, however, then a reduction in population caused by an environmental stressor (i.e. exposure to dispersed oil) has the potential to upset the entire system. Arctic ecosystems are limited in functional redundancy, and are therefore among the most fragile ecosystems on Earth (Chapman & Riddle 2005). Characteristically lower rates of reproduction among Arctic species, as well as stresses induced through climate change-related fluctuations in temperature, ice cover, and ocean acidity, only serve to further compound the ecosystems' fragility (Chapman & Riddle 2005; Barcott 2011).

Given the research linking chemically dispersed oil exposure to a variety of harmful health effects in marine organisms (summarized above), its potential impact on species within Arctic food webs raises particular concerns. Several studies have observed that phytoplankton populations, in particular, suffer the toxic effects of dispersant use disproportionately as compared with many other aquatic organisms (Almeda et al 2013; Almeda et al 2014; Ortmann et al 2012). This disproportionate effect on plankton populations may be attributable to the size of dispersed oil particles, which are often similar in size to plankton food particles and thus could be ingested at a relatively high rate (Almeda et al 2013). Given the foundational position these plankton populations occupy within Arctic foodwebs (Ozhan & Bargu 2014), the disproportionate effects of chemically dispersed oil on phytoplankton populations pose serious threats to polar ecosystems' primary productivity, transfer of energy to higher trophic levels, and overall ecosystem stability (Yang et al 2014; Ozhan et al 2014).

When speaking of the Arctic region in particular, seasonal increases in water temperatures result in a brief, but significant, bloom of phytoplankton, which is responsible for imbuing upper trophic levels of the region's marine ecosystem with large quantities of energy for primary production (Wassmann et al 2006; Ozhan et al 2014). In a study performed on temperate plankton species, Ortmann et al observed that

> the addition of dispersant and dispersed oil resulted in a rapid decrease in the biomass of primary producers, especially for diatoms [a species of phytoplankton]. A large negative impact on primary producer [i.e. phytoplankton] biomass would decrease the carbon available to larger microzooplankton and the mesozooplankton that graze directly on phytoplankton

and thus cause a large-scale shift in energy transfer throughout a foodweb (2012). Although this study was performed in laboratory conditions most closely resembling temperate marine environments, Nørregaard et al later extended Ortmann's conclusions to the Arctic phytoplankton species, *Calanus hyperboreus*, positing that an oil spill occurring during the species' annual springtime bloom has the potential to severely disrupt the functioning of entire Arctic food chains (2013). In fact, Ozhan & Bargu found that various species of phytoplankton were susceptible to the toxic effects of oil treated with Corexit 9500A at concentrations *lower* than would be expected in realistic spill scenarios (2014). This finding only further emphasizes the need to reduce the risk of species exposure to dispersed oil exposure marine environments as much as possible.

Beyond affecting the trophic transfer of energy, dispersed oil exposure to keystone ecosystem species has also been shown to result in the transfer of toxic petroleum components throughout the food chain (Wolfe et al 1998; Wolfe et al 2001). In a 2014 study published by Yun et al, it was found that "the biochemical composition of phytoplankton is directly related to food quality for higher trophic levels"—thus, any accumulation of toxins among plankton populations has the potential to "lead [to] change[s] in the nutritional status, reproduction periods, and survival strategy of higher trophic levels." In two different studies, Wolfe et al traced the trophic transfer of a toxic petroleum compound, naphthalene, from dispersed oil throughout an experimental food chain consisting of a primary producer *(Isochrysis galbana)*, a planktonic primary consumer *(Brachionus plicatilis),* and a larger fish *(Atherinops affinis)* (1998; 2001). Wolfe et al observed that dispersant use increased the rate of passage of naphthalene throughout the food chain in a variety of environmental conditions (Ibid.).anders

e. Oil Spills in Context: The Beaufort and Chukchi Seas

Many researchers and environmental advocates believe the Beaufort and Chukchi Seas, small subsets of the Arctic Ocean located along the northern Alaskan and Canadian coastlines (Figure 7), to be areas in which future study of oil spills and spill remediation should focus. These seas boast a rich array of natural resources as well as a variety of marine species dependent upon their unique balance of aquatic mineral and salt concentrations. In addition, the marine region has captured the interest of oil and gas companies in recent years due to its large reserves of offshore oil and gas (NRDC 2007; Oppel et al 2009); indeed, the US Department of the Interior has estimated the Chukchi to contain upwards of 12 billion barrels of oil in reserve, and the Beaufort to contain upwards of seven billion (DOI 2012). The numbers for natural gas are similarly staggering—50 trillion cubic feet and 24 trillion cubic feet, respectively (Ibid.). These findings demonstrate the potential value of the Beaufort and Chukchi as sources of domestic oil and gas production.

Unfortunately, along with drilling operations comes an increased risk for oil spills. Between the years of 1996 and 2004, there were 4,534 oil spills across the southern perimeter of the Arctic Ocean—a region consisting of the Alaskan North Slope (including the Chukchi Sea) as well as the Beaufort Sea (NRDC 2007). Climate change-induced reductions in total ice cover have allowed for a greater degree of oil exploration and drilling in the region to take place in recent years, as ice floes that once physically barred ships from reaching certain locations have undergone significant decreases in size (National Audubon Society 2013). If the current trend continues—and if the area is opened to exploratory offshore drilling—the number of spills in this region can only be expected to increase.

As discussed above, oil spills and use of chemical dispersants present unique challenges in Arctic environments. The Beaufort and Chukchi Seas are no exception. Although research concerning the effects of dispersants in these waters is still lacking, knowledge of the region's environmental characteristics as well as previously existing research on dispersant dynamics should guide future research and proffer initial hypotheses.

Both the Beaufort and the Chukchi Seas experience large seasonal fluctuations in water temperature, ice cover, and light penetration. During the winter, the average surface temperature of the water ranges from -20°C to -30°C, ice cover reaches almost 100%, and levels of primary productivity decrease due to lack of light penetration (Zhang et al 2003). During the summer, on the other hand, water temperatures range from 0°C to -10°C, ice cover recedes, and the resulting influx of sunlight drives a dramatic bloom in primary productivity (Ibid.; Whitehouse 2012; Gardiner et al 2013). The Beaufort and Chukchi also share similar patterns in seasonal salinity, with the highest values occurring during the summer months and the lowest values occurring during the late fall and winter (Weingartner et al 2005; Yang & Comiso 2007).

As in most Arctic Ocean ecosystems, the low levels of species diversity in the Chukchi and Beaufort Seas produce short, relatively simple food webs. Species assemblages in both bodies of water tend to be smaller in open-water compared to coastal regions (Word & Pinza 2008). Food webs in both bodies of water rely heavily on phytoplankton and zooplankton for energy transfer to higher trophic levels, with copepods and euphasiids comprising the most important zooplankton species in this niche (Ibid.; Nørregaard et al 2013). Diatoms, dinoflagellates, flagellates, and chrysophytes constitute the most common phytoplankton in the Beaufort (Ibid.); chrysophytes, prasinophytes, diatoms, dinoflagellates, and haptophytes in the Chukchi (Hill et al 2005). Similar to other Arctic areas, plankton productivity is also limited by seasonal fluctuations in light penetration and nutrient availability due to changing ice cover (Word & Pinza 2008).

III. Concerns and Implications for Future Research

There is a clear need for additional research regarding the effectiveness and safety of oil dispersants in Arctic regions. Although many studies have assessed the efficacy of dispersants in the laboratory at low water temperatures, low water salinities, or with the presence of ice, very few have studied their efficacy in more realistic experimental environments featuring all three. Extrapolation of results from current studies to the field may be problematic due the absence of additional influences such as UV radiation, environmental weathering, realistic wave energy, realistic ice cover, or sediment. Moreover, the research that exists regarding the potential for harm to polar species largely covers the effects from *acute* exposure to dispersants and dispersed oil, rather than effects from a more realistic scenario of long-term exposure to sub-lethal concentrations. Further uncertainty exists as to whether these effects on species vary throughout the year, in accordance with the seasonal fluctuations in Arctic environmental and biologic conditions. Underlining this variety of gaps in the research is the fundamental question of the role physically and chemically dispersed oil could play in Arctic ecosystem harm or collapse given its relative fragility compared to more temperate systems.

Following our review of the existing literature summarized and discussed above, there appear to numerous gaps in the research covering dispersants, especially the propriety of its use in Arctic environments. Below, we present recommendations for further study, which we believe will help to clarify the costs and benefits of deploying the oil spill mitigation strategy in Arctic waters.

1. The expected impact of chemically dispersed oil on Arctic ecosystem function. Many recent studies of dispersant use in Arctic conditions have focused on resolving the question of effectiveness. However, if dispersants are eventually found (or reformulated) to be effective in Arctic conditions, this will raise a far more serious questions regarding their impacts. Given current findings regarding the toxicity of chemically dispersed oil, larger questions of overall ecosystem impacts must begin to be addressed before chemical dispersants are used in Arctic conditions.

2. **The lipophilic character of dispersant and dispersed oil particles**. Research has demonstrated that dispersants tend to become more fat-soluble in waters of low salinity, which poses serious issues for ecosystems situated at Northern latitudes. Animals and humans living in this region generally exhibit high levels of body fat, a common energetic adaptation to colder climates. As a result, these individuals often possess higher tissue concentrations of lipophilic environmental contaminants than those seen in individuals living in warmer climates. This accumulation may be further compounded by the high consumption of fatty animal products among Native peoples, a necessity given the lack of edible vegetation available in these harsh environmental conditions. When evaluating dispersant toxicity in the Arctic, researchers must take into account their greater fat-solubility *in addition to* the longer exposure times and slower rates of accumulation, detoxification, and depuration characteristic to organisms living in these regions.

3. Seasonal environmental and biological fluctuations experienced in polar ecosystems and organisms and this fluctuation's impact on toxicity. It generally understood that water temperature is positively correlated with metabolism in aquatic organisms, with higher metabolic rates in the summer and lower metabolic rates in the winter. Decreased metabolic rates, typically characteristic of the winter season, entail decreased rates of food intake, growth, contaminant accumulation, and detoxification among aquatic species. Decreased rates of contaminant accumulation may suggest greater resilience to toxin exposure in the short-term, but decreased rates of detoxification may serve to negate this benefit in the long term. Because the majority of toxicity testing is acute in nature, it is unclear as to how exposure to dispersed oil might affect Arctic organisms over the course of a year. Further, during the summer,

increased food intake and a heightened metabolism may suggest an increase in the organism's bodily accumulation of toxins. However, the increased effectiveness of dispersants at warmer temperatures, in addition to the faster rate of oil particle biodegradation, may counter such effects by decreasing the length of time in which organisms are exposed to inert oil particles during the summer months.

4. Variance in levels of ocean acidity in the Arctic throughout the year. It is widely understood that human activities over the past century have significantly increased the amount of CO_2 circulating in the atmosphere, as well as the amount that is dissolved into ocean water. The uptake of CO_2 by ocean water is a natural process that occurs to a greater extent during the summer months in the Arctic, when the overall level of ice cover is reduced. However, recent increases in atmospheric carbon dioxide and reductions in surface ice cover—both resulting from climate change—have led to higher degrees of acidification in the Arctic compared to elsewhere. This phenomenon may pose serious consequences to Arctic biota, especially in regard to the toxicity of environmental contaminants.

Studies suggest that many Arctic species may respond to changes in ocean acidity with a decrease in overall metabolic rate, and a slower metabolism may help minimize the physiologic stresses caused by increased concentrations of dissolved CO_2 by slowing various bodily processes. Accumulation of toxins constitutes one of these processes. Thus, uptake of dispersant and dispersed oil particles from seawater may be impeded in some species given an increase in the level of ocean acidity. At the same time, a decreased metabolic rate could also result in slower processes of detoxification and depuration, and may ultimately result in the toxins that *are* accumulated remaining in the body for longer.

Another factor with the ocean acidity changes is the effect of decreased pH on the composition of aquatic microbe communities—those primarily responsible for the breakdown of dispersed oil into inert particles. While no firm and consistent conclusions exist as to the *specific* effects of acidification on species composition, general consensus holds that the make-up of aquatic microbe populations—plankton, bacteria, fungi, etc.—will indeed undergo drastic changes, potentially reducing the extent of dispersed oil biodegradation that is possible.

5. Surface salinity modeling of areas targeted for offshore oil development. Prior to the 2000s, several studies sought to rigorously measure salinity in Arctic waters. However, there appears to be a relative dearth of new research considering this issue, especially with the type of precision that would clarify the effectiveness impacts that could be expected in areas being considered for offshore drilling. Further, existing research on this issue is not always in agreement, with estimates of salinity in specific Arctic waters covering a problematically large range.

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Representative Submittal from Earthjusctice | Document is too voluminous to include in SEIS | All comments reviewed and considered

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0217
Comment from Erik Grafe, Earthjustice

Submitter Information

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Email: egrafe@earthjustice.org
Phone: 907-792-7102
Organization: Earthjustice

General Comment

Bureau of Ocean Energy Management
1200 Pennsylvania Ave. NW.
Washington, D.C. 20460

That attached document includes the names of 52,662 individuals who have submitted public comments
urging the U.S. Bureau of Ocean Energy Management to address concerns about potential impacts of oil and gas drilling in the Arctic Ocean. In addition to signing on in support of the following letter, 5,617 individuals of the total number have submitted personalized comments. The personalized comments start on page 3 and end on page 380.

RE: Please Reject Oil and Gas Lease Sale 193 (Docket ID BOEM-2014-0078)

Dear Bureau of Ocean Energy Management Regulation and Enforcement,

I am writing to urge you to protect the wildlife and people of the Chukchi Sea from risky, reckless oil drilling, and to take a step away from dirty fossil fuels, by deciding to reject oil and gas lease sale 193. Last January, the Ninth Circuit Appeals Court declared the lease sale unlawful, requiring you to redo the analysis of environmental effects of drilling in the sea and reconsider whether the region should be open to drilling at all. This is the second time the massive offshore oil and gas sale, which was rushed through based on poor science and

Representative Submittal from Earthjusctice | Document is too voluminous to include in SEIS | All comments reviewed and considered

arbitrary assumptions, has been sent back by the courts. Please do not make the mistake of opening the Chukchi Sea to oil drilling a third time.

The Chukchi Sea is home to irreplaceable wildlife, including polar bears, walruses, bowhead whales, ice seals, and dozens of bird species, and to a thriving indigenous culture. The sea already is under tremendous stress from climate change. Just this fall, some 35,000 walruses were forced ashore in a crowded coastal haul-out because of dramatic sea ice melt, placing them far from food sources and exposing mothers and calves to the risk of trampling from stampedes.

Drilling and other industrial oil and gas activities in the Chukchi Sea put Arctic people and wildlife at risk from noise and disturbance, air and water pollution, and oil spills. The draft supplemental EIS demonstrates clearly that the effects of leasing in the Chukchi Sea could be catastrophic. For example, in the EIS, the Department of the Interior acknowledges that there is a 75 percent chance that one or more large oil spills would occur if the leases are developed. There is no way effectively to clean up or contain an oil spill in Arctic Ocean conditions. In the face of these risks and the myriad other serious adverse effects the document acknowledges would accompany oil development even in the absence of an oil spill, the choice is clear--you must not affirm the lease sale.

Exploring for and developing oil in the Chukchi Sea also puts the climate at risk. As President Obama has recognized, much of the world's fossil fuels will have to remain in the ground, undeveloped, if we are to have even a chance of reaching our climate goals. Drilling in the rapidly melting Arctic Ocean for more oil that will only further heat the planet adds climate insult to climate injury. Yet the draft EIS does not even consider the climate impacts of burning the oil produced as a result of the sale. It should. The lease sale decision is a golden opportunity for the Obama administration to show climate leadership by deciding to leave dirty Arctic oil in the ground by keeping the Chukchi Sea off limits to drilling.

Please reject Chukchi Sea lease sale 193.

Sincerely,

The Undersigned

Attachments

BOEM-2014-0078_Lease_Sale_193

file:///S|/...20Sale%20193/FDMS%20Downloads/Document%20List%2022-12-2014%2018-49-50-743_docs/BOEM-2014-0078-0217.html[12/22/2014 8:35:56 PM]

EARTHJUSTICE

ALASKA CALIFORNIA FLORIDA MID-PACIFIC NORTHEAST NORTHERN ROCKIES NORTHWEST ROCKY MOUNTAIN WASHINGTON, D.C. INTERNATIONAL

December 22, 2014

Bureau of Ocean Energy Management
1200 Pennsylvania Ave. NW.
Washington, D.C. 20460

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HEADQUARTERS 50 CALIFORNIA STREET, SUITE 500 SAN FRANCISCO, CA 94111
T: 415.217.2000 F: 415.217.2040 INFO@EARTHJUSTICE.ORG WWW.EARTHJUSTICE.ORG

Representative Submittal from Earthjusctice | Document is too voluminous to include in SEIS | All comments reviewed and considered

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Sincerely,

The Undersigned

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Nancy Rabener
890 Haida Ln
Fairbanks, AK 99712-2924

From my time living in the Alaskan sub-arctic, and working many months as a laborer on the arctic sea coast, I know how fragile our northern ecosystem is. Even the smallest of disturbances reverberate long and hard. I do not believe the oil industry, the State of Alaska, the federal government including the US Coast Guard are prepared to address oil related accidents or the every day effects of industrial and construction activity. We need to take especially delicate care of this vulnerable arctic coast. Please, no drilling. The risk is too great. Thank you, Nancy Rabener

Jean Hoegler
2400 Douglas Hwy
Juneau, AK 99801-2034

I just saw a documentary film on the effects of the Deepwater Horizon' explosion and spill in the Gulf of Mexico, effects still seen and claimants still unpaid. Stop these oil and gas lease sales.

Pamela Weaver
Po Box 83713
Fairbanks, AK 99708-3713

PS: I live in Alaska and I am very much against any Arctic lease sale. I worked on the Exxon Valdez oil spill and I know any kind of arctic spill would be far worse. We do not have the know-how or technology to clean up any kind of spill in arctic temperatures and ice. These areas are extremely sensitive and are already stressed environmentally. She'll oil's previous exploits in the Chukchi illustrate clearly how foolish this pursuit is. Please cancel this sale.

Molly Mcdermott
5100 Vaquero Rd
Anchorage, AK 99516-3014

As a biologist and an Alaskan, I have looked at the potential for harm in the Chukchi Sea if it is open for drilling. It is not in the best interests of our state or country, and I urge you to reject the lease sale. Thank you.

James Massa
933 Little Creek Ct
Fairbanks, AK 99709-6474

As an Alaskan and an oceanographer who has studied the effects of he Exxon Valdez spill and who currently works in the arctic studying climate change, I am opposed to this proposal. The US should be leaders in developing alternative energy sources leading the way away from fossil fuels. Thank you for reading my letter.

Jim Farrell
331 5th Ave
Fairbanks, AK 99701-5025

Can't clean the Gulf of Mexico how is it possible to clean the Arctic Ocean???? Thank you for reading my letter.

Representative Submittal from Earthjusctice | Document is too voluminous to include in SEIS | All comments reviewed and considered

Niklaus Lotscher
Po Box 1741
Homer, AK 99603-1741

Exploring for and developing oil in the Chukchi Sea puts the climate at risk. As President Obama has recognized, much of the world's fossil fuels will have to remain in the ground, undeveloped, if we are to have even a chance of reaching our climate goals. Drilling in the rapidly melting Arctic Ocean for more oil that will only further heat the planet adds climate insult to climate injury. Yet the draft EIS does not even consider the climate impacts of burning the oil produced as a result of the sale. It should. The lease sale decision is a golden opportunity for the Obama administration to show climate leadership by deciding to leave dirty Arctic oil in the ground by keeping the Chukchi Sea off limits to drilling. Please reject Chukchi Sea lease sale 193. my letter.

Alice Ciostek
13601 E Norman Ave
Palmer, AK 99645-9469

I am a life long Alaskan that was born and raised in Alaska. We need to protect the Arctic from oil and gas development. This area is remote and it will be impossible to clean up any pollution should a spill happen when there is sea ice. The technology is just not available yet not to mention how this will impact the wildlife that are already being threatened by climate change. Please do your part to try and preserve this area for generations to come as a wild wilderness undamaged by oil and gas drilling. Thank you for standing up to the corporate pressures.

Dolores Farrell
3501 Halibut Point Rd
Sitka, AK 99835-9528

I do not think any rational individual or agency would bet on a spill free future or any chance of ever cleaning up after it in the vulnerable Arctic!

Laura Baldwin
1401 Cordova St Apt 5
Anchorage, AK 99501-5293

If you lived in Alaska you would know the Arctic is dying. If you saw starving polar bears and unhealthy numbers of walrus hauled out in the same place you wouldn't be considering this. It is a disaster waiting to happen.

Annie Mcpherson
Po Box 33823
Juneau, AK 99803-3823

Please do not allow oil and gas lease sales in the Arctic Ocean. It is critical habitat and risks, in all likelihood, permanent and widespread harm in the event of a spill. Thank you for your consideration.
Annie McPherson

Ellis Doeven
Po Box 222
Point Hope, AK 99766-0222

Please do the right thing!

Representative Submittal from Earthjusctice | Document is too voluminous to include in SEIS | All comments reviewed and considered

John Gaedeke
3083 Moose Mt. Rd.
Fairbanks, AK 99709

Responsible development means having the proper tools in place to mitigate spills and ruptures as they happen. The Chukchi Sea doesn't even have adequate Coast Guard or Coastal Policy in place. Until then, no leases.

Christin Anderson
1715 Reed Cir
Fairbanks, AK 99709-6559

Thank you for reading my letter, and taking the time to care.

Jen Landry
Po Box 151
Gustavus, AK 99826-0151

The Arctic ocean does not need oil development.

Mark Gutman
Po Box 1082
Talkeetna, AK 99676-1082

The ecology of the Arctic Ocean is being jeopardized with climate change and the mass land gatherings of walruses is indicative of this.

Victoria Mcdonald
6526 Rogers Pass Rd
Ketchikan, AK 99901-9745

This is no place to drill for oil; mistakes cannot be corrected easily unless it's after after many days and equipment breakdowns. Thank you for reading my letter.

Mary Helen Stephens
Po Box 1272
Valdez, AK 99686-1272

We do not want any offshore oil development. So STOP the lease sales. Thank you for reading my letter.

Barbara Wheeler
307 Gran Ave
Homewood, AL 35209-4119

I am very concerned about what will happen with this drilling. I have a home on the gulf coast and that was devastating. Let's find other means to energy.

Diane Difante
460 Grier Rd
Wetumpka, AL 36092-3929

Allowing oil and gas leases in the Arctic is too risky. A spill would be impossible to clean up and would put animals and the environment at too great a risk. Please vote against oil and gas leases in the Chukchi and all arctic waters and lands.

Phyllis Wallace
7684 Twin Beech Rd Apt 1203
Fairhope, AL 36532-8005

Ban the Arctic drilling forever. We can't risk the consequences of drilling in the Arctic, no matter whether there is oil &/or gas there.

Christine Gambles
2386 Butter And Egg Rd
Troy, AL 36081-4432

Do NOT drill in the Chukchi Sea! This endangers wildlife and people who live in the surrounding area.

Patricia Smith
3441 Idlewild Ct
Montgomery, AL 36106-2327

It is vital that you stop the oil and gas lease sale in the Arctic Ocean.

Linda Mcclendon
858 County Road 1850
Arab, AL 35016-2432

Now is the time to embrace the future by investing in renewable energy instead of fossil fuel. Using incidents from history, the cost of fossil fuel is too high. We must reduce our dependence on fossil fuel. Begin this historical step in the right direction by rejecting oil and gas leases and lease sales. Thank you for reading my letter.

Julie Gobbell
67 County Road 747
Cullman, AL 35058-0928

Please consider the information below and help the local people, the environment, and the wildlife by moving away from fossil fuels and investing in clean energy.

Marena Dove
811 County Highway 54
Guin, AL 35563-2127

Thank you

Chris Garner
1611 13th Pl S
Birmingham, AL 35205-6603

Thank you for reading my letter.please save our Arctic waters. It is vital to the beautiful wildlife.

Patricia Johns
5703 Tannahill Cir Se
Huntsville, AL 35802-1833

The BP spill our home on the Gulf of Mexico. A spill in tropical waters takes years to remedy. Keep drilling out of the Arctic!

Representative Submittal from Earthjusctice | Document is too voluminous to include in SEIS | All comments reviewed and considered

Carolyn Haines
2486 Ellen Dr
Semmes, AL 36575-6508

This madness has to stop--please, please protect these waters. The damage done here can never be undone.

Kathleen Cherry
1112 Chalet Dr E
Mobile, AL 36608-3608

We need to consider our environment, not just oil and gas. The long term consequences must be taken into account!

Jean Langford
11901 Pleasant Ridge Rd Apt 612
Little Rock, AR 72223-2488

Please do all you can to protect the oceans & all the inhabitants!! Some of them are dear mammals!! PlEase be humane & responsible - not just bowing to insensitive industry types who do not care to preserve our oceans for our children - future generations!! Thanks & blessings, Jean Langford, Little Rock

David Parker
8211 Hatcher Lake Rd
Sherwood, AR 72120-9755

Earth's wildlife and biodiversity, and a clean, healthy global environment, always take precedence over the petrol fascists' greed and profits.

Terri Bitting
4160 E Hewitt Springs Rd
Springdale, AR 72764-4761

I hope you will take to heart, and I do mean take to heart the real affect of pulling oil out of the ground and how it permanently taints our lives, the ecosystems, the bioregions and the very earth we inhabit. The real issue here is if you have the courage to see the truth and to act on that truth. Oil and gas companies have proven their track record when comes to the responsibility of cleaning up the messes they have created...they have no responsibility! They continue to do harm to the planet in irreversible ways. The whole of the earth is at risk unless the oil companies are reigned back and not given new ground and bioregions to destroy in their wake. STAND UP AND REJECT OIL AND GAS LEASE SALE 193!

Angela Pitts
2292 N Creekwood Ave
Fayetteville, AR 72703-4171

It is stunning that we must revisit this issue again. Drilling in the artic is simply too risky. With gas prices already plunging and alternative resources that need developing, these leases are completely unnecessary and will only result in harm.

Representative Submittal from Earthjusctice | Document is too voluminous to include in SEIS | All comments reviewed and considered

Arleen Wiley
130 Polk Road 238
Mena, AR 71953-9688

Leaders that are strong in Stewardship of the Earth's Lands are gravely needed today...Leaders who will place the future of the Planet ahead of destructive Corporate Greed..will History record this as one giant step in our destruction of the Earth?

Sharylla Jackson
Po Box 157
Amagon, AR 72005-0157

please leave them alone!!! Before so many of god's creatures are gone..

Jamese Greer
550 S Timberlane Dr
El Dorado, AR 71730-4264

Promote renewable energy Thank you for reading my letter.

Paul Morstad
456 N Oliver Ave
Fayetteville, AR 72701-3931

Thank you for considering these points.

Bill Carroll
301 Country Club Rd
Pocahontas, AR 72455-8802

The Chukchi Sea belongs to the walruses and other sea creatures--not to big oil. They already have to much.Thank you for reading my letter.

Debra Kelley
123 Main St
Mountain Home, AR 72653-8730

We only have so many chances left to do right, not expect that we know more than Nature or can fix our environmental "mistakes" (I put the last in quotes b/c the feeling from our here is corporations only consider the cost of mistakes, not the fact they can't actually be fixed.)

Joy Fox
344 Combs Avw.
Fayetteville, AR 72701-6117

Why do we need to prove this over and over? Because some corporations are not interested in the writing on the wall. So, as someone said, hundreds of years ago.... we need to take the sword from a child's hands. Thank you for reading my letter.

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0226
Comment from Marissa Knodel, Friends of the Earth

Submitter Information

Name: Marissa Knodel
Address:
1100 15th St. NW
11th Floor
Washington, DC, 20005
Email: mknodel@foe.org
Phone: 2022220729
Organization: Friends of the Earth

General Comment

See attached file(s)

Attachments

Lease Sale 193 Combined Comments_22 Dec 2014

Representative of Friends of Earth | Document is to voluminous to include in SEIS | All comments were reviewed and considered

Michael Rothier
Program Analysis Officer, BOEM

Dear Mr. Routhier,

I am writing to express opposition to approval of Lease Sale 193 in the Chukchi Sea. Opening the Chukchi Sea to oil and gas drilling would be catastrophic. There is no such thing as safe or responsible drilling in the Arctic Ocean -- Shell's record of recklessness and the federal government's own environmental analysis show that approval of Lease Sale 193 would be unsafe, dangerous, and irresponsible.

Revised environmental analysis finds drilling to be unsafe

Last year, the Ninth Circuit declared Lease Sale 193 unlawful due to the Bureau of Ocean Energy Management's inadequate analysis of the environmental effects of drilling, such as an underestimation of the risks of a large oil spill. In April 2014, the District Court for the District of Alaska ordered the agency to conduct a draft supplemental environmental impact statement. According to the revised analysis, the agency found a 75 percent chance that one or more large oil spills (more than 1,000 barrels, or 42,000 gallons of oil) could occur, and that there is no effective method to clean up or contain such a spill in the remote, difficult Arctic Ocean conditions. The government also found that many species of marine wildlife, including beluga whales and ringed seals, would face substantial injury and mortality in the face of an oil spill.

Oil and gas industry's dismal record in the Arctic

Oil and gas companies have no business drilling in the Chukchi Sea, an important and fragile ecosystem upon which numerous species and communities depend. Shell was forced to cancel its 2013-2014 drilling plans when a series of accidents involving its ships, support equipment, and drilling rigs demonstrated a serious lack of preparedness when operating in the Arctic. Following Shell's difficulties, ConocoPhilips and Statoil also suspended their Alaskan Arctic drilling plans. Recently, Noble Drilling, a sub-contractor of Shell, pled guilty to eight felony charges related to environmental and safety violations, including failures to report equipment malfunctions and hazardous weather conditions, and negligently discharging polluted wastewater into the Alaskan Arctic Ocean.

Climate change in the Arctic

The Arctic is already experiencing some of the worst and most rapid impacts of climate disruption. Alaska has warmed twice as fast as the rest of the nation, leading to less sea ice, receding glaciers, thawing permafrost, and rising ocean temperatures and acidification that negatively impact community infrastructure, wildlife habitat, and fisheries. Lease Sale 193 presents an opportunity for the Obama administration to shift away from oil and gas drilling and leave these dirty fossil fuels in the ground. The Bureau of Ocean Energy Management should prioritize the safety and health of the people and wildlife that live near and within the Chukchi Sea and deny approval of Lease Sale 193.

Thank you for your consideration.

Representative of Friends of Earth | Document is to voluminous to include in SEIS | All comments were reviewed and considered

Sincerely,

Eric gregory

, 18661

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Thank you for your consideration.

Representative of Friends of Earth | Document is to voluminous to include in SEIS | All comments were reviewed and considered

Sincerely,

Daniela Marin

, 571

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Climate change in the Arctic

The Arctic is already experiencing some of the worst and most rapid impacts of climate disruption. Alaska has warmed twice as fast as the rest of the nation, leading to less sea ice, receding glaciers, thawing permafrost, and rising ocean temperatures and acidification that negatively impact community infrastructure, wildlife habitat, and fisheries. Lease Sale 193 presents an opportunity for the Obama administration to shift away from oil and gas drilling and leave these dirty fossil fuels in the ground. The Bureau of Ocean Energy Management should prioritize the safety and health of the people and wildlife that live near and within the Chukchi Sea and deny approval of Lease Sale 193.

Thank you for your consideration.

Representative of Friends of Earth | Document is to voluminous to include in SEIS | All comments were reviewed and considered

Sincerely,

Karen Alarcon
2235 Cedar Ave
Long Beach, CA 90806

Representative of Friends of Earth | Document is to voluminous to include in SEIS | All comments were reviewed and considered

Michael Rothier
Program Analysis Officer, BOEM

Dear Mr. Routhier,

I am writing to express opposition to approval of Lease Sale 193 in the Chukchi Sea. Opening the Chukchi Sea to oil and gas drilling would be catastrophic. There is no such thing as safe or responsible drilling in the Arctic Ocean -- Shell's record of recklessness and the federal government's own environmental analysis show that approval of Lease Sale 193 would be unsafe, dangerous, and irresponsible.

Revised environmental analysis finds drilling to be unsafe

Last year, the Ninth Circuit declared Lease Sale 193 unlawful due to the Bureau of Ocean Energy Management's inadequate analysis of the environmental effects of drilling, such as an underestimation of the risks of a large oil spill. In April 2014, the District Court for the District of Alaska ordered the agency to conduct a draft supplemental environmental impact statement. According to the revised analysis, the agency found a 75 percent chance that one or more large oil spills (more than 1,000 barrels, or 42,000 gallons of oil) could occur, and that there is no effective method to clean up or contain such a spill in the remote, difficult Arctic Ocean conditions. The government also found that many species of marine wildlife, including beluga whales and ringed seals, would face substantial injury and mortality in the face of an oil spill.

Oil and gas industry's dismal record in the Arctic

Oil and gas companies have no business drilling in the Chukchi Sea, an important and fragile ecosystem upon which numerous species and communities depend. Shell was forced to cancel its 2013-2014 drilling plans when a series of accidents involving its ships, support equipment, and drilling rigs demonstrated a serious lack of preparedness when operating in the Arctic. Following Shell's difficulties, ConocoPhilips and Statoil also suspended their Alaskan Arctic drilling plans. Recently, Noble Drilling, a sub-contractor of Shell, pled guilty to eight felony charges related to environmental and safety violations, including failures to report equipment malfunctions and hazardous weather conditions, and negligently discharging polluted wastewater into the Alaskan Arctic Ocean.

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Sandra oflaherty

, 05486

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Sincerely,

John Nacci
125 knowlesway ext apt 4
narragansett, RI 02882

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PUBLIC SUBMISSION

As of: December 19, 2014
Received: December 19, 2014
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Comments Due: December 22, 2014
Submission Type: Web

Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0160
Comment from John Deans, Greenpeace USA

Submitter Information

Name: John Deans
Address:
702 H St NW #300
Washington, DC, 20001
Email: john.deans@greenpeace.org
Phone: (202) 462-1177
Organization: Greenpeace USA

General Comment

Attached below are 113,143 comments on the Environmental Impact Statement for Lease Sale 193. Unless otherwise indicated in the "Response Text" column, commenters signed their name to the comment below. (However, please note that many people did write their own comment or edit the one provided - those are shown where applicable.)

Comment text: Stop Arctic Drilling!

"Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk.

In April 2014, the National Academy of Science's National Research Council made it clear we

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don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed.

Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014.

You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted.

It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development."

Attachments

SEIS comments

SEIS comments_mo

SEIS comments_c

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Last	First	City	State	Response Date	Response Text
Swanson	Anne	Crescent Ci	CA	11/17/2014 23:01	Dear BOEM, Please prevent Shell Oil Compar
Risk	Taylor	Sandy	UT	11/19/2014 23:05	DONT DRILL IN THE ARTIC Polar bears drown
Quinn	Theresa	Springfield	NH	11/20/2014 14:20	Don't turn the Chukchi Sea into the Gulf of M
Metcalf-Mc	Sandra	Moorpark	CA	11/30/2014 0:49	Drilling for oil in the US Arctic poses too large
Canter	Emily	Roswell	GA	11/19/2014 10:52	How can this county kowtow to prospects of
Hines	Christy	Encinitas	CA	11/17/2014 10:10	I am writing to ask BOEM to help protect the
Druss	Gloria	Ardmore	PA	11/17/2014 10:19	I do not want my government causing these t
Rodgers	Cynthia	Spring City	PA	12/10/2014 13:31	If there is any chance of an oil spill, Shell shou
Savides	Peggy	Mondovi	WI	11/17/2014 8:11	In April 2014 the National Academy of Scienc
Krupkowsk	Peter	Plainfield	VT	11/17/2014 7:50	In April 2014, the National Academy of Scienc
Caputo	Kathi	Lebanon	TN	11/17/2014 8:43	In April 2014, the National Academy of Scienc
Martin	Paula	Longview	TX	11/17/2014 8:52	In April 2014, the National Academy of Scienc
Olivares	Rafael	Lakewood	CO	11/17/2014 12:38	In April 2014, the National Academy of Scienc
Foster	Leah	New Orlear	LA	11/17/2014 12:56	In April 2014, the National Academy of Scienc
Knight	Andrew	Radcliff	KY	11/18/2014 8:20	In April 2014, the National Academy of Scienc
Brownstein	Seth	Burlington	VT	11/19/2014 10:01	In April 2014, the National Academy of Scienc
Schaser	Kay	Eureka	CA	11/19/2014 10:19	In April 2014, the National Academy of Scienc
Hauer	J	Santa Fe	NM	11/19/2014 10:29	In April 2014, the National Academy of Scienc
Justis	Laurie	Montpelier	VT	11/19/2014 10:56	In April 2014, the National Academy of Scienc
Herron	Linda	Duluth	MN	11/19/2014 11:05	In April 2014, the National Academy of Scienc
Doherty	Beth	Canton	OH	11/19/2014 11:48	In April 2014, the National Academy of Scienc
Edwards	Patrick	Abilene	TX	11/19/2014 16:00	In April 2014, the National Academy of Scienc
Hebron	Theresa	Saint Louis	MO	11/20/2014 18:08	In April 2014, the National Academy of Scienc
Wadleigh	Jason	Las Vegas	NV	11/17/2014 16:25	It is a real future not to have polar bears anyr
Krantz	Jacqueline	Mountain \	CA	11/19/2014 19:51	It is clear that the Arctic lease sale is too dang
Finton	Ken And Ch	Arvada	CO	11/17/2014 10:43	It is clear that this lease sale is too dangerous
Sherman	Talitha	Torrance	CA	11/17/2014 13:14	It is clear that this lease sale is too dangerous
Moore	Robert	Yardley	PA	11/17/2014 15:03	It is clear that this lease sale is too dangerous
Nygren	Kenneth	Richmond	VA	11/17/2014 17:07	It is clear that this lease sale is too dangerous
Allen	Shirley	Dayton	NV	11/19/2014 10:48	It is past time to start weaning off and diversi
Clark	Tor	Falmouth	MA	11/19/2014 10:15	it's not just about the wildlife- people live the
Phillips	Gerry	Whittier	CA	11/19/2014 15:32	KEEP SHELL OUT OF THE ARTIC. 75% IS A HUG
Uffelmann	Elsie	Worcester	MA	11/19/2014 13:35	Kindly be foreward-thinking and disallow She
Kermeen	Renee	Middleville	MI	11/22/2014 14:14	Oil and gas has a big spill in the gulf that they
Pate	Ann	Butler	KY	11/19/2014 10:31	OK so, Shell tried in to drill in the Chukchi Sea
Schaffner	Lia	New York	NY	11/17/2014 22:55	Okay, animals are dieing and you can do som
Mogerman	Elaine	Ann Arbor	MI	11/17/2014 9:02	PLEASE DO NOT FORSAKE OUR PLANET!! THE
Luedke	Kurt	Iron Ridge	WI	11/17/2014 9:20	PLEASE HELP!!!!!!!!!! Polar bears drowning ir
Harrison	Michael	Bolton	CT	11/19/2014 10:46	Please just say no. Polar bears drowning in oi
Vandersch	Carol	Atlanta	GA	11/17/2014 10:03	Please stop this insanity! Polar bears drownir
Lee	Faith	Elmhurst	IL	11/19/2014 12:57	Please! Let's choose a healthy planet for toda
Friedrich	Barbara	Merion Sta	PA	11/19/2014 17:07	PLEASE, NO DRILLING IN HE ARCTIC. THANK \
Love	Robert	Prospect H	NC	11/17/2014 8:04	Polar bears drowning in oil. Whales inhaling t
LaPlante	Roy	Wynnewoc	PA	11/17/2014 9:00	Polar bears drowning in oil. Whales inhaling t
Marcus	Grania	Rochester	NY	11/19/2014 13:18	Polar bears drowning in oil. Whales inhaling t
Rubio	Anthony	Watsonville	CA	11/21/2014 11:34	Polar bears drowning in oil. Whales inhaling t

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Lackey	Mercedes	Claremore	OK	11/19/2014 21:01	A recent government analysis found that ther
Westbrook	Bonnie	Southport	NC	11/17/2014 9:28	A recent government analysis found that ther
Newman	Suzan	Green Valle	CA	12/18/2014 16:27	A recent government analysts found there is a
Phillips	Hope	Round Mo	TX	11/22/2014 8:24	A Texan, I have seen the devastation of the BF
Horton	Tracey	Waterville	ME	11/17/2014 18:29	A three in four chance of a spill is unacceptabl
Brooks	Jennifer	Newbury P	CA	11/17/2014 15:25	ABSOLUTELY NOT!! NO, NO, NO!!!! I can't be a
Morse	Douglas	New York	NY	11/19/2014 12:08	According to a recent US government analysis
Talcott-Full	Julie	Portland	OR	11/17/2014 10:50	According to a report by the Bureau of Ocean
Hurd Glenr	Janine	La Mesa	CA	11/17/2014 10:46	According to Bureau of Ocean Energy Manage
McCurdy	Dan	Rochester	IL	11/17/2014 19:16	According to Green Peace polar bears drowni
Solomon	Samantha	Spokane	WA	11/17/2014 14:52	According to the Bureau of Ocean Energy Mar
Dilliplane	Susanna	Washingto	DC	11/17/2014 10:02	According to the Bureau of Ocean Energy Mar
Artz	Lynn	Crawfordvi	FL	11/17/2014 21:28	According to the Supplemental Environmenta
Burgess	Jane	West Brom	None	11/18/2014 17:18	According to your analysis there's a three out
Dobson	Linda	Seal Beach	CA	11/19/2014 15:46	According to your analysis, Mr. Cruikshank, th
Farley	Jeannette	Oakland	CA	11/19/2014 11:59	According to your analysis, Mr. Cruikshank, th
Turner	Carolyn	Bailey	NC	12/16/2014 8:37	According to your analysis, Mr. Cruikshank, th
Wolff	Carmen	Monterey	CA	11/19/2014 11:16	According to your analysis, Mr. Cruikshank, th
Gibbs	Adrienne	Boulder	CO	11/17/2014 21:16	According to your analysis, Mr. Cruikshank, th
Ravenscraf	Dh	Wickenbur	AZ	11/19/2014 10:29	According to your analysis, Mr. Cruikshank, th
di Mauro	Alexander	Chicago	IL	11/17/2014 7:35	According to your analysis, Mr. Cruikshank, th
Sullivan	Colleen	Portland	OR	11/17/2014 7:56	According to your analysis, Mr. Cruikshank, th
Dancer	Galaxy	Crestone	CO	11/17/2014 8:31	According to your analysis, Mr. Cruikshank, th
Dubrow	Barry	Rockville	MD	11/17/2014 9:02	According to your analysis, Mr. Cruikshank, th
Green	Glenda	San Francis	CA	11/17/2014 10:35	According to your analysis, Mr. Cruikshank, th
Glaeske	Lynne	Denver	CO	11/17/2014 10:36	According to your analysis, Mr. Cruikshank, th
Gardner	Laurel	Easthampt	MA	11/17/2014 12:33	According to your analysis, Mr. Cruikshank, th
Deaton	Douglas	Portland	OR	11/17/2014 18:10	According to your analysis, Mr. Cruikshank, th
Willey	Brian	Austin	TX	11/17/2014 19:28	According to your analysis, Mr. Cruikshank, th
Dolley	Sarah	Bolingbroo	IL	11/17/2014 23:09	According to your analysis, Mr. Cruikshank, th
Touchstone	Lana	Vallejo	CA	11/17/2014 23:41	According to your analysis, Mr. Cruikshank, th
Knight	Zouleika	Edgewater	NJ	11/18/2014 5:39	According to your analysis, Mr. Cruikshank, th
Casey	Cynthia	Sunnyside	NY	11/19/2014 10:40	According to your analysis, Mr. Cruikshank, th
Lanwerme	Barbara	Brasstown	NC	11/19/2014 19:14	According to your analysis, Mr. Cruikshank, th
Kneile	Ruth	Des Moine	IA	11/19/2014 19:54	According to your analysis, Mr. Cruikshank, th
Krueger	Gabrielle	Sacrament	CA	11/19/2014 23:18	According to your analysis, Mr. Cruikshank, th
Recla	Matt	Boise	ID	11/28/2014 13:00	According to your analysis, Mr. Cruikshank, th
Lipman-Ste	Elizabeth	Brooklyn	NY	12/2/2014 6:26	According to your analysis, Mr. Cruikshank, th
O'Brien	Lee	Fort Collins	CO	11/17/2014 9:00	According to your analysis, Mr. Cruikshank, th
Davis	Virginia	Woodinvill	WA	11/18/2014 0:17	According to your analysis, Mr. Cruikshank, th
Browne	Nancy	Roseville	MN	11/19/2014 10:50	According to your analysis, Mr. Cruikshank, th
Loving	Joy	Grottoes	VA	11/17/2014 15:46	According to your analysis, Mr. Cruikshank, th
Mcgeary	Jessica	Winthrop	MA	11/17/2014 8:10	According to your analysis, Mr. Cruikshank, th
Wright	Kathleen	Bozeman	MT	11/17/2014 8:57	According to your analysis, Mr. Cruikshank, th
Imes	John	Columbus	MS	11/19/2014 15:58	According to your analysis, Mr. Cruikshank, th
Hermanns	Marc-Andr	Simmerath	None	11/20/2014 4:13	According to your analysis, Mr. Cruikshank, th
Bigelow	James	Long Beach	CA	11/19/2014 11:15	According to your analysis, Mr. Cruikshank, th

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It is past time to start weaning off and diversifying dirty oil, gas and coal companies to solar and wind. The technology is here and available. Instead of continuing the polluting and destruction of our nation and this world, our government has to show the intelligence and commitment in saving what is still viable and cleaning up the horrid mess we've made in our environment. WE HAVE TO TAKE THE RESPONSIBILITY to stop it from continuing to create further permanent damage. My God! what does it take for people that are suppose to care and be intelligent leaders and stewards of our world to realize we HAVE TO MAKE THE TURN NOW. It will be decades until the damage we've already done has time to TRY to repair itself. We will still have many years of gas and diesel vehicles on the road but we have to start taking the reins to CHANGE NOW. Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This drilling in the pristine artic is an UNACCEPTABLE RISK. There has to be a point and place where we say NO!

Prince William Sound- locations ring a bell? Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic

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Kindly be foreward-thinking and disallow Shell from drilling in the fragile arctic ecosystem. We are all too familiar with the consequences to the human race of not protecting irreplaceable wilderness.

Oil and gas has a big spill in the gulf that they cant stop or control after HOW MANY DAYS of pollution!!!!!!! For us to even think of allowing them to drill up in the Artic is so crazy!!!!!!

Reprsentative of Greenpeace Submittal	Attachment too voluminous to include in SEIS	All comments were reviewed and considered

OK so, Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Okay, animals are dieing and you can do something to save them! You can save Mother Earth!!!!!! Come on! No matter how much money is paid, you have to stop Artic drilling!!! Polar bears are dieing! Animal, innocent animals who didn't do anything to us is dieing? Your just going to stand there and kill someone?!???! All animals have a right, we are here to stand and protect Mother Earth!!! It's time you step up! Make a stand to Mother Earth!!!! Care for her. She is OUR mother. PLEASE DO NOT FORSAKE OUR PLANET!! THE POTENTIAL DESTRUCTION IS BEYOND YOU, YOUR $$$$, AND YOUR GRANDCHILDREN. DO NOT LET THIS HAPPEN!!!! IT IS UP TO US TO PROTECT OUR MOTHER EARTH FOR GENERATIONS TO COME. PLEASE PLEASE PLEASE THINK BEYOND YOURSELF..... FROM A VERY CONCERNED AND INFORMED CITIZEN,

and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be

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Your reports that you have invested in have shown that there is a 75% chance of a terrible accident A THREE OUT OF FOUR CHANCE....?!?!?! Of a spill.... are you bent on destruction? The BP disaster in the last couple of years in the Gulf has completely killed off the Gulfstream there is no way they can clean this up in this area of water and it is doing immeasurable damage . CHANGING THE TEMPERATURES OF OUR WATERS AND AFFECTING OUR WEATHER SYSTEMS. THIS IS EASY TO SEE IN WEATHER REPORTS ALL AROUND THE WORLD you Cannot justifiably be digging into this precious part of our planet without knowing the consequences and and having no viable way to clean up any mistakes you will inevitably make WHOMEVER IS READING THIS Mr Cruikshank et all YOU HAVE A RESPONSIBILITY TO ALL OF MANKIND WE ARE ALL UNITED AS HUMAN BEINGS AND ANYTHING YOU DO WILL BE DONE TO ALL OF US COLLECTIVELY INCLUDING YOURSELF AND THOSE DEAR TO YOU. IF YOU HAVE CHILDREN SURELY YOU WANT THEM TO LIVE IN A WORLD THAT IS SAFE AND CLEAN AND HAS A CHANCE OF SURVIVAL WHAT YOU ARE TRYING TO DO IS AGAINST ALL THESE PRINCIPLES Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases

Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic

You've seen the form letter probably several hundred if not thousands of times. This is just me saying we need to stop drilling for oil. It is far too hazardous, too risky, too filthy, and too costly on many levels. Let's work on clean energy that protects and preserves the environment before it's too late.

You've seen the messages from Greenpeace and others about the dangers and technical difficulties in arctic drilling. I'd like to add a note about why it's not in our interests to do it. Arctic drilling will be hugely expensive. It's purpose will be to take a precious natural resource, one that is produced by 300 million years of natural process, not by the drilling companies that propose to "produce" it, tear it out of the ground and burn it! Is that the best use of our money? What if we put the same money into wind and solar energy plants? What if we put it into research on battery technology and electric cars? What if we put it into mass transportation to move more people, faster, with less impact on the earth? That's what I would vote for.

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Yup--gotta help 'em. Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be

:rowaves from Cell phones and WiFi. ALL THE ABOVE ARE ABUSES OF ALL LIFE ON EARTH "

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A 75% risk of spill is absolutely unacceptable. Especially with Shell has a terrible of cleaning up its spills. It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development.

While citizens have a right to be heard, their knowledge of the drilling issue is limited and usually based on emotion rather than science. Look to the best sources of information on this topic. The National Research Council of the National Academy of Sciences described the risk in April , 2014. Their wisdom trumps any citizens, or the misguided interests of an Oil Company. Do what is best for the Arctic and deny the drilling.

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A large oil spill in the Arctic would be a disaster! Please do not allow drilling in the Chukchi Sea. We do not need Lease Sale 193. We don't know enough about oil in US Arctic conditions to clean it up. Even if we defied all odds and never had a spill (virtually impossible), the 4 billion barrels taken our of Chukchi Sea would have horrendous effects on climate change. This sale is way, way too dangerous to let happen. Please invalidate the lease sale and make the Arctic off-limits to oil

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Comment from John Deans, Greenpeace USA

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General Comment

The comments attached are on behalf of Greenpeace and our 260,000 US members. They include several arguments as to why this SEIS is flawed and why Lease Sale 193 is unlawful and should be vacated.

Attachments

Greenpeace Comments Dec 19_2014 on SSEIS for Lease 193

GREENPEACE

Public Comments
BOEM-2014-0078-0001

Chukchi Sea Planning Area

Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska
BOEM 2014-653
Outer Continental Shelf EIS/EA

Draft Second Supplemental Environmental Impact Statement
Volumes 1-2

22 December 2014

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Introduction

Greenpeace hereby challenges Federal Lease Sale 193 (FLS 193) of approximately 29.4 million acres for oil and gas development in the Chukchi Sea, Alaska and the associated Draft Second Supplement Environmental Impact Statement (Draft SSEIS) published on 31 October 2014 by the Federal Bureau of Ocean Energy Management (BOEM). Pursuant to the U.S. Ninth Circuit Court of Appeals remand order on 22 January 2014, these public comments are provided by Greenpeace and the organization's 260,000 members across the United States and 2.8 million members worldwide. Greenpeace USA calls on the United States Secretary of the Interior and BOEM to vacate FLS 193 or choose Alternative II – No Lease Sale – based on the following substantive issues:

Federal Lease Sale 193 and its associated Draft SSEIS (BOEM 2014a) are unlawful, flawed, negligent, arbitrary, and capricious and contravene:

** The National Environmental Policy Act (NEPA), the Clean Air Act, and Environmental Assessment process,*

** The Endangered Species Act (ESA) and legally mandated regulations of the United States Fish and Wildlife Service (USFWS), the National Marine Fisheries Service, and the National Oceanic and Atmospheric Administration,*

** Policies of the Environmental Protection Agency (EPA),*

** Recommendations of the United Nations Intergovernmental Panel on Climate Change (IPCC) supported by the United Nations Environment Program (UNEP), the World Meteorological Organization (WMO), and globally by all 195 IPCC member nations,*

** Recent actions by the Executive Office of the President of the United States, including multilateral international agreements to substantially reduce greenhouse gas emissions, and*

** Regulations and guidelines of the Executive Office of the President of the United States advised by the Council on Environmental Quality (CEQ).*

In particular:

1) BOEM conducts its analyses in its Draft SSEIS for FLS 193 based on the projected minimum recoverable resources despite its estimate of an average of nearly four times that amount. As a result, BOEM significantly underestimates likely scenarios and fails to consider all possible environmental impacts required by

NEPA. Such minimizations and underestimations are unlawful, contravene NEPA and the Clean Air Act, and are negligent, dismissive, arbitrary, and capricious.

2) As required by and in violation of NEPA and CEQ regulations and guidelines, BOEM failed to analyze the substantial and significant greenhouse gas (GHG) and black carbon (BC) emissions and the reasonably foreseeable proximate impacts of climate change caused by the end use of FLS 193 oil and gas production.

3) BOEM conducts its analyses in its Draft SSEIS for FLS 193 based only on the projected minimum recoverable resources (e.g. 4.3 Bbbls oil) despite its estimate of an average of nearly four times that amount at 15.38 billion barrels (Bbbls) of technically recoverable oil and 76.77 trillion cubic feet of undiscovered natural gas. Such minimizations and underestimations are unlawful, contravene NEPA, and are highly negligent, dismissive, arbitrary, and capricious.

4) As required by and in violation of NEPA and CEQ, BOEM failed to analyze the substantial and significant social and economic costs of the reasonably foreseeable proximate impacts of GHG emission effects on climate change caused by the end use of FLS 193 oil and gas production.

5) The affirmation and $2.66 billion sale of FLS 193 is unlawful. This substantial sale occurred and its projected financial benefits were published prior to drafting and approval of a Final EIS and were significant factors in the Federal government's decision to a) approve the sale despite the known significant, severe, wide-spread, and long-lasting risks and negative impacts, b) uphold the lease *vs.* rescinding the lease and the Federal government's subsequent financial exposure from its i) legal obligation to buy back the lease and ii) loss of projected royalties in excess of $46 - $89 billion, and c) prejudice its analysis in favor of financial gain *via* selection of its preferred alternative of production despite the action's significant, long-term, wide-spread and in some cases, severe and irrevocable environmental, social, and cultural harms.

6) BOEM's impact scale and analyses are arbitrary and capricious. BOEM does not analyze the proposed action's impacts *via* a quantifiable metric or scale and instead a) uses an inadequate, biased, ambiguous, inconsistent, and subjective assessment, b) grossly minimizes the environmental impacts of the proposed action, c) contradicts its own analyses in favor of the preferred alternative to maintain the sale and develop the resources, and d) fails to provide sufficient information for an informed decision of alternatives.

7) The United States Department of the Interior, the United States Department of the Treasury, and BOEM proceeded with, affirmed, and accepted $2.66 billion for the sale of Lease 193 in favor of its preferred alternative to develop oil and gas resources on public property despite its own conclusions as well as warnings by USFWS, EPA, NOAA, and NMFS that Federally listed and candidate Endangered and Threatened species could suffer significant, long-term, conspicuous, and/or

widespread population-level losses and irreparable harm as a result of the proposed action.

8) On 3 December 2014, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) announced a critical habitat designation for Arctic subspecies (*Phoca hispida hispida*) of the ringed seal (*Phoca hispida*) under the Endangered Species Act (ESA) covering 350,000 square miles of the northern Bering, Chukchi, and Beaufort seas, which would encompass the FLS 193 project area. In addition, in December 2012, NMFS listed four subspecies of the ringed seal as Threatened or Endangered under the ESA (77 FR 76740). The proposed critical habitat rule notes that the seals and their habitats could be adversely affected by numerous oil and gas activities, including seismic surveys, drilling operations, production, development, and potential oil spills, among others. NOAA and the ESA state that oil and gas activities must consider the seals' critical habitat as well as that for other Federally listed species, including whales, walrus, Beringia bearded seal DPS, and polar bears. These species have a critical habitat of the ocean for essential resources and sea ice for resting, birthing and nursing. NMFS will be taking comments for 90 days until March 2015, and will hold public hearings in Alaska on all aspects of the proposal and relevant impacts of the proposed designation. Greenpeace and its 2.8 million members worldwide are on record strongly supporting this designation. Proceeding with FLS 193 would endanger ringed seals, bearded seals, polar bears, whales, Pacific walrus, and other species and would contravene the Endangered Species Act and Federal regulations of NOAA, NMFS, and the USFWS.

9) Significant abundances and densities of the cold water soft coral, *Gersemia rubiformis*, which is critical for, and a highly significant component of, the Arctic ecosystem upon which numerous threatened and endangered species rely, were newly discovered where the proposed activities of FLS 193 are intended to occur. These corals are equal to or greater than most coral rich areas of the world, but are under significant threat from oil and gas activities resulting from FLS 193 and its substantive contributions to climate change. Greenpeace provided this information to BOEM on 16 August 2012, but BOEM has failed to specifically consider and analyze this significant new information in its 2014 Draft SSEIS analyses as required by NEPA.

In consideration of these and additional substantive issues set forth in the proceeding comments, Greenpeace calls upon the United States Federal Government to vacate Federal Lease Sale 193 in its entirety or select Alternative II – No Lease Sale.

1) BOEM conducts its analyses in its Draft SSEIS (BOEM 2014a) for FLS 193 based on the projected minimum recoverable resources and, as a result, significantly underestimates the full range of likely scenarios and fails to consider all foreseeable direct and indirect impacts as legally required by NEPA.

As described by BOEM (2014a) below, all of the analyses in its Draft SSEIS (BOEM 2014a) for FLS 193 are based on the Agency's projected minimum production scenario of the minimum recoverable resources (e.g. 4.3 Bbbls oil) despite its estimate of a reasonably foreseeable mean of nearly four times that amount at 15.38 billion barrels (Bbbls) of technically recoverable oil and 76.77 trillion cubic feet of undiscovered natural gas:

> "The Chukchi Sea OCS is viewed as one of the most petroleum-rich offshore areas in the country, with geologic plays extending offshore from some of the largest oil and gas fields on Alaska's North Slope. BOEM's current petroleum assessment indicates a mean technically recoverable oil resource of 15.38 billion barrels (Bbbl) with a 5% chance of 40.08 Bbbl (BOEMRE 2011a). The mean undiscovered gas resources total 76.77 trillion cubic feet (Tcf) with a 5% chance of 209.53 Tcf. At these levels, the leasing of offshore areas within the Chukchi Sea may lead to development and production, and could contribute significantly to the national energy supply."

Ninth Circuit Court of Appeals records, along with BOEM's own communications and analyses, clearly demonstrate that the agency has been well aware of the magnitude of oil and gas production since at least 2006: "BOEM was fully aware from the very beginning that if one billion barrels could be economically produced, many more barrels could also be economically produced" (Fletcher et al. 2014). BOEM's (2014) impact analyses, however, only consider the minimum because, as stated in the Draft SSEIS, BOEM believes a) the likely scenario is zero production, b) it is unknown how much oil and gas would be produced, and c) it is unknown what those end uses would be and in what quantities. As a result, BOEM does not account for the full range of impacts, including cumulative effects, as required by NEPA if production is to occur. In a highly relevant legal precedent, Judge Jackson (2014) of the U.S. District Court of Colorado aptly states:

> "The agency cannot—in the same FEIS—provide detailed estimates of the amount of coal to be mined (CRR-0154023 at 0154112-13) and simultaneously claim that it would be too speculative to estimate emissions from "coal that may or may not be produced" from "mines that may or may not be developed." The two positions are nearly impossible to reconcile."

As Judges Fletcher et al. (2014) of the Ninth Circuit Court of Appeals note: "BOEM considered only the *best* case scenario for environmental harm, assuming oil development. A best case scenario 'skew[s]' the data toward fewer environmental impacts, and thus impedes a 'full and fair discussion of the potential effects of the project.' *Native Ecosystems Council v. U.S. Forest Serv.*, 418 F.3d 953, 965 (9th Cir. 2005) (citation and internal quotation marks omitted)" (Fletcher et al. 2014). Although Judges Fletcher et al. (2014) refer to BOEM's previous Final EIS (BOEM 2011a), BOEM continues to base all of its analyses, scenarios, and impact assessments using *only* its minimum production estimate in its latest Draft SSEIS (BOEM 2014a). According to Judge Fletcher of the Ninth Circuit Court of Appeals (Fletcher et al. 2014) (emphasis added):

> "Under NEPA, BOEM is required to take into account the full environmental effects of its actions when deciding whether and in what manner to pursue the lease sale. 42 U.S.C. § 4332(2)(C). A later project or site-specific environmental analysis is an inadequate substitute for an estimate of total production from the lease sale as a whole. ***It is only at the lease sale stage that the agency can adequately consider cumulative effects of the lease sale on the environment, including the overall risk of oil spills and the effects of the sale on climate change***. It is also only at the lease sale stage that the agency can take into account the effects of oil production in deciding which parcels to offer for lease."
>
> "***The agency cannot shirk its responsibility to 'consider[] all foreseeable direct and indirect impacts' of the proposed action in its EIS.*** *N. Alaska Envtl. Ctr.*, 457 F.3d at 975 (internal quotation marks omitted). The agency also must 'discuss[] . . . adverse impacts' without 'improperly minimiz[ing] negative side effects.'"
>
> "Once BOEM made the determination that production is reasonably foreseeable, it was ***required to consider the full cumulative impact of that production***."

Although BOEM raised its former minimum estimate from 1 Bbbls of recoverable oil to 4.3 Bbbls of recoverable oil for its current Draft SSEIS (BOEM 2014a), BOEM ignores in its 2014 Draft SSEIS determinations by both the Ninth Circuit Court of Appeals and the EPA to consider the full range of production and subsequent impacts (*as cited in:* Fletcher 2014). As a result BOEM grossly underestimates foreseeable and likely impacts. This is supported by the EPA, which stated that by BOEM maintaining its analyses based only on its minimum production estimate rather than on the mean it is "significantly underestimating likely scenarios" (*as cited in:* Fletcher 2014).

In its latest Draft SSEIS (BOEM 2014a) BOEM also determined that zero production is the most likely outcome for FLS 193, but if development occurs only one anchor field and one

satellite field would potentially be developed. As determined by the Ninth Circuit Court of Appeals, such analysis is "flawed" (*see* Fletcher et al. 2014):

> "Defendants argue that…the most likely foreseeable outcome is no oil development at all….This analysis is flawed….BOEM concluded that oil production was 'reasonably foreseeable.' There is a substantial basis for this in the record because, as noted by BOEM, 'the area has high oil resource potential and there is existing transportation infrastructure to move oil from northern Alaska to distant markets.' Once BOEM made the determination that production is reasonably foreseeable, it was required to consider the full cumulative impact of that production. *See* 40 C.F.R. § 1508.7."

BOEM (2014a) states that given current economic conditions, the most likely scenario would be 4.3 Bbbls of economically recoverable oil. Yet, BOEM (2014a) contradicts itself by stating that an approximate mean of 3 - 4 times more oil (15.4 Bbbls) than the minimum estimate of 4.3 Bbbls "could conceivably be discovered and produced" (emphasis added):

> "BOEM's 2011 Resource Assessment estimates that the Chukchi Sea OCS contains significant concentrations of naturally-occurring hydrocarbons that can conceivably be discovered and recovered. The report estimates that the Chukchi Sea OCS contains a mean UTRR of 15.4 billion barrels of oil (Bbbl) and 76.8 trillion cubic feet (Tcf) of gas. ***These volumes could conceivably be discovered and produced with current industry technology***….In BOEM's latest Resource Assessment, at a $110 per barrel oil price, 11.5 Bbbl of oil (75% of the UTRR) could be economic to develop, if discovered."

Despite its own estimates of reasonably foreseeable production, BOEM uses only its estimated minimum to base all of its analyses and, consequently, conflates the impacts in all of its environmental assessments. Other federal agencies, such as the EPA and USFWS, as well as the Ninth Circuit Court of Appeals (*see* Fletcher et al. 2014) judged that the mean and a full range of estimates from low to high is "a more likely occurrence" and should be used (emphasis added):

> "***The mean estimate of economical oil production, at the center of the distribution curve, is by definition a more likely occurrence*** than is the lowest estimate of viable oil production. Previous EISs in the Chukchi Sea had used the mean estimate of oil production as the basis for their analyses, and those EISs had also included low and high estimate."
>
> "***(H)aving decided that oil production was reasonably foreseeable, NEPA required BOEM to base its analysis on the full range of likely production if oil production were to occur.***"
>
> "The Division of Migratory Bird Management at the U.S. Fish and Wildlife Service ("FWS") similarly challenged the one billion barrel estimate as inaccurate: ***The basic assumptions used in the analysis of effects are flawed with regards to the size of***

> ***development scenarios. The [Draft EIS ("DEIS")] states that the current petroleum assessment indicates a mean recoverable oil resource of 12 billion barrels; yet all environmental analyses reported in the DEIS are based on a development of 1 billion barrels, thereby significantly underestimating likely scenarios.***"

Underestimating the environmental impacts of a proposed Federal action is in direct contravention of both the National Environmental Policy Act (NEPA) and regulations of the United States Environmental Protection Agency (EPA) and the Council on Environmental Quality (CEQ). In addition, the U.S. Fish and Wildlife Service (USFWS) informed BOEM that the possible impacts from only a 1 Bbbl level of production would have most likely led to a jeopardy finding by the USFWS for the Endangered spectacled and Steller's eiders. As such, BOEM would not have been able to proceed with FLS 193 under the Endangered Species Act (ESA) or would have had to request an exemption from the "no jeopardy" rule (*as cited in*: Fletcher et al. 2014):

> "BOEM's estimate also informed FWS's determination that Lease Sale 193 would not jeopardize listed species. The record suggests that FWS was close to finding, even under the one billion barrel assumption, that the lease sale would jeopardize the spectacled and Steller's eiders. Had BOEM not selected the least amount of oil necessary for production, FWS may well have concluded that the listed species were in jeopardy. *See* 16 U.S.C. § 1536(a)(2)."

Given the current estimate of 4.3 Bbbls is more than four times greater, it is fairly certain that the USFWS would have determined that resulting impacts would have surely jeopardized these Endangered species.

Such minimizations and underestimations by BOEM, which are replete throughout the current Draft SSEIS and that BOEM relies on for its impact analyses to support its recommendation for its preferred alternative of production, contravene NEPA and are highly inadequate, dismissive, and negligent. Because, the CEQ, NEPA and the Ninth Circuit Court of Appeals require that BOEM "*consider all foreseeable direct and indirect impacts*" of the proposed action in its EIS, including during the lease sale stage, and that "*it must discuss adverse impacts without improperly minimizing negative side effects*" (emphasis added), the current Draft SSEIS (BOEM 2014a) is wholly insufficient and new analyses that account for all foreseeable direct and indirect impacts must be provided to the public for consideration. In fact, given BOEM's "zero production" assumption is flawed and BOEM's production scenarios, which were primarily designed only for the sake of the EIS exercise (BOEM 2014a), have been ruled to be arbitrary and capricious, then by law it must redraft the EIS with analyses of all possible direct and indirect

impacts, including based on projected minimum, mean, and maximum levels of production (*see* Fletcher et al. 2014).

Furthermore, given that BOEM's analysis indicates the probability of at least two large spills and subsequent impacts is 75% even at the minimum levels of production (BOEM 2014a), such a significant probability of an environmental disaster is wholly unacceptable by any standard or existing law and BOEM itself should never have proceeded with FLS 193. Indeed, the Deepwater Horizon and Exxon Valdez disasters, Shell's own ships grounding in Alaskan waters, and numerous other examples demonstrate that large spills can occur at any point in the process. According to a recent and highly important report by the National Research Council (NRC), consisting of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine, "the risk of a serious oil spill in the Arctic is escalating" and "present an even greater challenge" (NRC 2014). Furthermore, much of the research and work on oil spill response and technologies have been done only for warmer regions with better climatic conditions (NRC 2014). The NRC (2014) stated that additional research, including validating current and emerging oil spill response technologies in Arctic environmental conditions on operational scales, is urgently needed to make informed decisions about the most effective response strategies for Arctic spills (NRC 2014). The NRC (2014) concludes:

> "The risk of a serious oil spill in the Arctic is escalating due to potential increases in shipping traffic and oil and gas activities. To provide an effective response effort in challenging Arctic conditions—and minimize impacts on people and sensitive ecosystems—a full range of proven oil spill response technologies is needed."
>
> "Mounting an effective oil spill response is difficult in any environment, but oil spills in Arctic waters present an even greater challenge."

NOAA (2014) validates this very serious problem: "oil spills under ice or in ice-covered waters….cannot be contained or recovered effectively in current technology," and that "tanker spills, pipeline leaks, and oil blowouts are likely to occur in the future, even under the most stringent regulatory and safety systems." (75 Fed. Reg. 77487, 77509) In its Draft SSEIS, BOEM (2014a) acknowledges that current emergency response infrastructure and technologies are insufficient in the region for handling large and very large oil spills, blowouts, etc. BOEM (2014a), and further acknowledges that a very large spill would have significant consequences (emphasis added):

> "There is a lack of accident response resources in the Arctic as well as a lack of effective techniques for containing or cleaning up spilled oil under ice or in broken ice. There are also challenges associated with conducting a rapid, effective spill response in a region where weather is often severe, daylight may be limited, and accidents may happen in remote locations (AMAP 2007)."
>
> "***A very large oil spill and gas release would present sustained degradation of water quality from hydrocarbon contamination in exceedence of State and Federal water and sediment quality criteria. These effects would be significant.*** Additional effects on water quality would occur from response and cleanup vessels, in-situ burning of oil, dispersant use, discharges and seafloor disturbance from relief well drilling, and activities on shorelines associated with cleanup, booming, beach cleaning, and monitoring."

Furthermore, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) (2014) specifically cautions:

> "(O)il spills under ice or in ice-covered waters….cannot be contained or recovered effectively in current technology…tanker spills, pipeline leaks, and oil blowouts are likely to occur in the future, even under the most stringent regulatory and safety systems. (75 Fed. Reg. 77487, 77509)."

In essence, it is a highly negligent Federal action and abuse of discretion and authority that BOEM proceeded with the sale despite a) its own analysis and knowledge of a 75% probability of one or more large spills without adequate emergency response or technology available in the region and b) not providing sufficient analyses and information to the public and decision makers regarding the full range of direct, indirect and cumulative impacts for a reasoned choice of alternatives. Federal Lease Sale 193 must be vacated on this basis alone. Furthermore, in light of the fact that BOEM's insufficient and dismissive analyses are also arbitrary, capricious and an abuse of discretion and authority in order to proceed with FLS 193 for significant financial gain, the United States Federal Government must vacate Federal Lease Sale 193 in its entirety or select Alternative II – No Lease Sale.

2) As required by and in violation of NEPA, BOEM fails to analyze the substantial and significant greenhouse gas (GHG) and black carbon (BC) emissions and the reasonably foreseeable proximate impacts of climate change caused by the end use of FLS 193 oil and gas production.

Over the course of this multi-year process and EIA, BOEM has consistently ignored its legal obligation to provide sufficient and quantitative information and analyses of this Federal action's effects on, and input to, climate change. The most recent 2014 guidelines (published in December 2014 for public review) on GHG emissions and the NEPA process from the Executive Office of the President of the United States, as advised by the Council on Environmental Quality (CEQ) are very clear. It is understood these new CEQ (2014) instructions (highly relevant portions of which are provided in part below), were released to the public after BOEM published its 2014 Draft SSEIS. Nevertheless, BOEM is now obliged to adhere to the newest guidelines (CEQ 2014), which state, unequivocally, that as a Federal agency BOEM must include substantive and quantitative analyses regarding GHG emissions (emphasis added):

> "The ***analysis of impacts on the affected environment should focus on those aspects*** of the human environment ***that are impacted by both the proposed action and climate change.*** Climate change can affect the environment of a proposed action in a variety of ways…***and result in a proposed action's effects being more environmentally damaging.***"
>
> "***(A)n agency should compare the levels of GHG emissions caused by each alternative including the no-action alternative…to provide information to the public and enable the decision maker to make an informed choice***."
>
> "Accordingly, ***if a comparison of these alternatives based on GHG emissions,*** and any potential mitigation to reduce emissions, ***would be useful to advance a reasoned choice among alternatives and mitigations, then an agency should compare the levels of GHG emissions caused by each alternative including the no-action alternative***…and mitigations to provide information to the public and enable the decision maker to make an informed choice."
>
> "***The current and expected future state of the environment without the proposed action represents the reasonably foreseeable affected environment that should be described based on available climate change information, including observations, interpretive assessments, predictive modeling, scenarios, and other empirical evidence.***"
>
> "***If tools or methodologies are available to provide the public and the decision-making process with information that is useful to distinguishing between the no-action and proposed alternatives and mitigations, then agencies should conduct and disclose quantitative estimates of GHG emissions and sequestration…GHG estimation tools have become widely available,*** and are already in broad use not only in the Federal sector, but also in the private sector, by state and local governments, and globally."

> "***When assessing direct and indirect climate change effects, agencies should take account of the proposed action - including 'connected' actions – emissions from activities that have a reasonably close causal relationship to the Federal action, such as…a consequence of the agency action (often referred to as downstream emissions) (and) should be accounted for in the NEPA analysis***. After identifying and considering the direct and indirect effects, an agency must consider the cumulative impacts of its proposed action and reasonable alternatives."
>
> "'Cumulative impact' is defined in the CEQ Regulations as the '***impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions***'."
>
> "Consequently, ***agencies need to consider whether the reasonably foreseeable incremental addition of emissions from the proposed action, when added to the emissions of other relevant actions, is significant*** when determining whether GHG emissions are a basis for requiring preparation of an EIS."
>
> "40 CFR §§ 1508.7, 1508.8 (stating that:…(3) ***cumulative impacts consider the incremental addition to other past, present, and reasonably foreseeable future actions. This NEPA requirement applies to all proposed actions and calls for the disclosure of the full range of effects that flow from the action, regardless of the ability to control or regulate those effects***.). *See also* 52 FR 22517 (June 12, 1987)…Once the scope of analysis is determined, ***the agency must then assess the direct, indirect and cumulative effects of the proposed [F]ederal action.***")."

BOEM openly acknowledges that the activities resulting from FLS 193 would contribute to climate change, yet claims the emissions from this action would supposedly be "negligible":

> "The exploration, development and production activities under the Scenario would produce greenhouse gas (GHG) emissions and particulate matter (PM) that would contribute to climate change. The GHG and PM emissions from the Scenario would be small relative to global GHG and PM emissions, and therefore, the contribution of the Scenario to global climate change would be negligible." (Draft SSEIS, pg. 37).

Climate change is a global phenomenon and, by both definition and function, affects and causes changes in virtually every aspect on Earth, including human society. As such, the results of an action (e.g. GHG emissions) would need to be lasting and substantial to add to that phenomenon and "contribute" to its effects (IPCC 2013, 2014). BOEM acknowledges that the foreseeable impacts of this Federal action will contribute to climate change. However, emissions that actually contribute to climate change would not simply dissipate without exerting an effect. Thus, to make a contribution such effects could not be "negligible" (IPCC 2013, 2014). The scientific evidence is

clear that, at this point in time, anything that contributes to climate change is significant and could lead to irreversible impacts (IPCC 2013, 2014). BOEM (2014a) not only contradicts itself by stating that the action would produce GHGs that would "contribute to climate change", but only provides a subjective, arbitrary, and capricious assumption of supposed negligible impacts without any basis, data, information, or quantitative analyses to support that assumption.

BOEM appears to be making the assumption that analyses are only required for direct local emissions from exploration, production and development activities resulting from FLS 193. In addition to the fact that BOEM also does not provide any data, information or quantitative analyses to support this theory, such an assumption is wholly invalid according to NEPA, the Executive Office of the President of the United States as advised by CEQ, the Ninth Circuit Court of Appeals (*see* Fletcher et al. 2014), the US District Court of Colorado (*see* Jackson 2014), and numerous precedents cited therein. In fact, climate impacts are also required under NEPA as "cumulative impacts". As the CEQ (2014) instructs (emphasis added):

> "***(T)he statement that emissions from a government action or approval represent only a small fraction of global emissions…is not an appropriate basis for deciding whether to consider climate impacts under NEPA. Moreover, these comparisons are not an appropriate method for characterizing the potential impacts associated with a proposed action and its alternatives and mitigations.*** This approach does not reveal anything beyond the nature of the climate change challenge itself: the fact that diverse individual sources of emissions each make relatively small additions to global atmospheric GHG concentrations that collectively have huge impact."

Even so, there would be local stationary and mobile sources of GHG and BC emissions resulting from these activities that, in addition to falling under NEPA requirements, are subject to numerous federal and state regulations. This includes GHG and BC emissions regulated by the Clean Air Act (CAA). Guidelines from the Executive Office of the President of the United States, as advised by CEQ (2010, 2014) clearly state:

> "Where an activity is subject to GHG emissions accounting requirements, such as Clean Air Act reporting requirements that apply to stationary sources that directly emit 25,000 metric tons or more of CO_2-equivalent GHG on an annual basis, the agency should include this information in the NEPA documentation for consideration by decision makers and the public." (CEQ 2010)
>
> "In the agency's analysis of direct effects, it would be appropriate to: (1) quantify cumulative emissions over the life of the project; (2) discuss measures to reduce GHG emissions, including consideration of reasonable alternatives; and (3) qualitatively discuss the link between such GHG emissions and climate change."

> "The estimated level of GHG emissions can serve as a reasonable proxy for assessing potential climate change impacts, and provide decision makers and the public with useful information for a reasoned choice among alternatives."

It is necessary to emphasize that regardless of whether the federal action directly produces greater or less than 25,000 metric tons of CO_2-equivalent GHG emissions per year, particularly over long-lived actions such as FLS 193 (i.e., 77 years), CEQ (2010, 2014) clearly states as noted above that "*it would be appropriate to quantify cumulative emissions over the life of the project*" (emphasis added). However, BOEM provides no quantification even for direct source emissions from the oil and gas activities associated with FLS 193. In fact, CEQ (2010, 2014) recommends that analyses be conducted:

> "Specifically, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO_2-equivalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 25,000 metric tons of CO_2-equivalent, CEQ encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis."

The following are significant conclusions by the International Panel on Climate Change (IPCC) taken directly (emphases maintained) from the most recent IPCC (2014) Fifth Synthesis Report for Policymakers. These conclusions are based on and supported by more than 10,000 scientific studies and are highly relevant for Greenpeace's comments herein regarding the multiple problems with BOEM's Draft SSEIS (2014) and the consequences of Federal Lease Sale 193 to global climate change:

> "It is *extremely likely* that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in greenhouse gas concentrations and other anthropogenic forcings together….Anthropogenic influences have *likely* affected the global water cycle since 1960 and contributed to the retreat of glaciers since the 1960s and to the increased surface melting of the Greenland ice sheet since 1993. Anthropogenic influences have *very likely* contributed to Arctic sea-ice loss since 1979 and have *very likely* made a substantial contribution to increases in global upper ocean heat content (0–700 m) and to global mean sea-level rise observed since the 1970s."
>
> "Year-round reductions in Arctic sea ice are projected for all RCP (Representative Concentration Pathway) scenarios. A nearly ice-free Arctic Ocean in the summer sea-ice minimum in September before mid-century is *likely* A large fraction of species faces increased extinction risk due to climate change during and beyond the 21st century, especially as climate change interacts with other stressors (*high confidence*). Most plant

> species cannot naturally shift their geographical ranges sufficiently fast to keep up with current and high projected rates of climate change in most landscapes; most small mammals and freshwater molluscs will not be able to keep up at the rates projected under RCP4.5 and above in flat landscapes in this century (*high confidence*). Future risk is indicated to be high by the observation that natural global climate change at rates lower than current anthropogenic climate change caused significant ecosystem shifts and species extinctions during the past millions of years. Marine organisms will face progressively lower oxygen levels and high rates and magnitudes of ocean acidification (*high confidence*), with associated risks exacerbated by rising ocean temperature extremes (*medium confidence*). Coral reefs and polar ecosystems are highly vulnerable. Coastal systems and low-lying areas are at risk from sea-level rise, which will continue for centuries even if the global mean temperature is stabilized (*high confidence*)."
>
> "There is *high confidence* that ocean acidification will increase for centuries if CO_2 emissions continue, and will strongly affect marine ecosystems. Magnitudes and rates of climate change associated with medium- to high-emission scenarios pose an increased risk of abrupt and irreversible regional-scale change in the composition, structure, and function of marine, terrestrial and freshwater ecosystems, including wetlands (*medium confidence*). A reduction in permafrost extent is virtually certain with continued rise in global temperatures."
>
> "A large fraction of anthropogenic climate change resulting from CO_2 emissions is irreversible on a multi-century to millennial time scale, except in the case of a large net removal of CO_2 from the atmosphere over a sustained period."
>
> "Without additional mitigation efforts beyond those in place today, and even with adaptation, warming by the end of the 21st century will lead to high to very high risk of severe, widespread, and irreversible impacts globally (*high confidence*)."
>
> "In most scenarios without additional mitigation efforts (those with 2,100 atmospheric concentrations >1,000ppm $CO_{2\text{-eq}}$), warming is more likely than not to exceed 4°C above pre-industrial levels by 2100. The risks associated with temperatures at or above 4°C include substantial species extinction, global and regional food insecurity, consequential constraints on common human activities, and limited potential for adaptation in some cases (*high confidence).* Some risks of climate change, such as risks to unique and threatened systems and risks associated with extreme weather events, are moderate to high at temperatures 1°C to 2°C above pre-industrial levels."
>
> "Substantial cuts in greenhouse gas emissions over the next few decades can substantially reduce risks of climate change by limiting warming in the second half of the 21st century and beyond. Cumulative emissions of CO_2 largely determine global mean surface warming by the late 21st century and beyond. Limiting risks across RFCs would imply a limit for cumulative emissions of CO_2."
>
> "Delaying additional mitigation to 2030 will substantially increase the challenges associated with limiting warming over the 21st century to below 2°C relative to pre-industrial levels. It will require substantially higher rates of emissions reductions from 2030 to 2050; a much more rapid scale-up of low-carbon energy over this period; a larger reliance on CDR in the long term; and higher transitional and long-term economic impacts."

In essence, according to the IPCC, in the absence of significant mitigation and reductions *any* additional GHG emissions, including in the amounts produced from FLS 193, will not only lead to depleting the global carbon budget by the 2030s, but will lead to irreversible problems and costs caused by climate change.

A highly important direct-source pollutant affecting human health and the climate that is also missing in BOEM's analyses is black carbon (BC). According to the EPA (2014a):

> "Black carbon (BC) is the most strongly light-absorbing component of particulate matter (PM), and is formed by the incomplete combustion of fossil fuels, biofuels, and biomass." "BC contributes to the adverse impacts on human health, ecosystems, and visibility associated with PM (particulate matter)."
>
> "Short-term and long-term exposures to PM are associated with a broad range of human health impacts, including respiratory and cardiovascular effects, as well as premature death."
>
> "BC influences climate through multiple mechanisms:
>
> * Direct effect: BC absorbs both incoming and outgoing radiation of all wavelengths, which contributes to warming of the atmosphere and dimming at the surface."
>
> * Snow/ice albedo effect: BC deposited on snow and ice darkens the surface and decreases reflectivity, thereby increasing absorption and accelerating melting."
>
> * Other effects: BC also alters the properties of clouds, affecting cloud reflectivity and lifetime ("indirect effects"), stability ("semi-direct effect") and precipitation."
>
> "Sensitive regions such as the Arctic and the Himalayas are particularly vulnerable to the warming and melting effects of BC. "
>
> "Studies have shown that BC has especially strong impacts in the Arctic, contributing to earlier spring melting and sea ice decline. All particle mixtures reaching the Arctic are a concern, because even emissions mixtures that contain more reflective (cooling) aerosols can lead to warming if they are darker than the underlying ice or snow."
>
> "BC's short atmospheric lifetime (days to weeks), combined with its strong warming potential, means that targeted strategies to reduce BC emissions can be expected to provide climate benefits within the next several decades."
>
> "Mitigating BC can also make a difference in the short term for climate, at least in sensitive regions….Benefits in sensitive regions like the Arctic, or in regions of high emissions such as Asia, may include reductions in warming and melting (ice, snow, glaciers) and reversal of changes in precipitation patterns. BC reductions could help reduce the rate of warming soon after they are implemented. However, available studies also suggest that BC mitigation alone would be insufficient to change the long-term trajectory."

In essence, black carbon emissions are a highly significant detrimental and harmful consequence of FLS 193. BOEM (2014a) acknowledges both the existence and effects of BC:

> "The "cloud" of BC occurs over the Arctic from early winter until springtime. Climate effects from black carbon are especially strong in sensitive areas such as the Arctic, resulting in earlier annual spring melting and sea-ice decline."

However, BOEM fails to address this subject and its impacts in any substantive manner and does not provide sufficient, relevant or basic data, analyses or information regarding reasonably foreseeable impacts for an informed and reasoned choice of alternatives. This omission is highly negligent, arbitrary, capricious, and an abuse of discretion and authority.

BOEM simply fails to provide sufficient calculations for GHG and BC emissions, subsequent social, environmental, and economic costs, and reasonably foreseeable impacts that would result from the end use of recoverable oil and gas production from FLS 193. In addition, because BOEM does not consider the impacts from mean levels of production, which it states is a likely and reasonably foreseeable consequence of development (BOEM 2014a, Fletcher et al. 2014), the public, other federal and state government agencies, and other nations that would be impacted by FLS 193 and subsequent production, have not been provided sufficient information for a reasoned choice of action. Such an omission has been determined by a 2014 legal precedent for this precise issue to be "arbitrary, capricious or otherwise not in according to law. 5 U.S.C. § 706(2)(A)" (*see* Jackson 2014). For this reason, FLS 193 must be vacated according to precedent ruling by the US District Court of Colorado (*see* Jackson 2014):

> "Under the Administrative Procedure Act the Court is directed to hold unlawful and to set aside agency action found to be arbitrary, capricious or otherwise not in according to law. 5 U.S.C. § 706(2)(A). Thus, "vacatur" of the non-compliant agency action appears to be mandatory."

3) BOEM conducts its analyses in its Draft SSEIS for FLS 193 based only on the projected minimum recoverable resources (e.g. 4.3 Bbbls oil) despite its estimate of an average of nearly four times that amount at 15.38 billion barrels (Bbbls) of technically recoverable oil and 76.77 trillion cubic feet of undiscovered natural gas. Such minimizations and underestimations are unlawful, contravene NEPA and the CEQ, and are highly negligent, dismissive, arbitrary and capricious.

BOEM conducts its analyses in its Draft SSEIS (BOEM 2014a) for FLS 193 based only on the projected minimum recoverable resources (e.g. 4.3 Bbbls oil) despite its estimate of an average of nearly four times that amount at 15.38 billion barrels (Bbbls) of technically recoverable oil and 76.77 trillion cubic feet of undiscovered natural gas. Had BOEM conducted appropriate analyses, EPA (2014b) models of CO_2-equivalent emissions would demonstrate that if the mean levels of production occur that BOEM states are reasonably foreseeable and that BOEM uses for economic analyses and benefits, the resulting GHG emissions would be extraordinarily excessive and far beyond limits set by the IPCC and the current US Administration. Such emissions would not be sustainable and would add significantly to the effects of climate change, leading to irrevocable harm (IPCC 2013, 2014).

According to the EPA (2014b), "(t)he average heat content of crude oil is 5.80 mmbtu per barrel (EPA 2013)…the average carbon coefficient of crude oil is 20.31 kg carbon per mmbtu…(and) the fraction oxidized is 100 percent (IPCC 2006)" (*as cited* in: EPA 2014b). "Therefore, 5.80 mmbtu/barrel × 20.31 kg C/mmbtu × 44 kg CO_2/12 kg C × 1 metric ton/1,000 kg = 0.43 metric tons CO_2.equivalent/barrel" (EPA 2014b). At least 90% of oil consumed in the United States is burned as fuel (Graffe et al. 2011). Thus, based on the EPA (2014b) models, the end use of BOEM's mean estimate of 15.38 Bbbls would produce the equivalent of approximately 5,952,060,000 metric tons (Mt) of CO_2.equivalent if 90% were burned as fuel.

In addition, the EPA (2013, 2014b) estimates that "(t)he average carbon dioxide coefficient of natural gas is 0.0544 kg CO_2 per cubic foot…(and) the fraction oxidized to CO_2 is 100 percent (IPCC 2006)" (*as cited in*: EPA 2014b). Based on these models, the end use of BOEM's mean estimate of 76.77 trillion cubic feet would produce 4,176,288,000 $MtCO_2$.equivalent.

Thus, the reasonably foreseeable mean amount of CO_2.equivalent that would be produced over the 44 years of mean production and result from the end use of Federal Lease Sale 193 is: 10,128,348,000 $MtCO_2$.equivalent (or 10.128348 $GtCO_2$.equivalent), which equates to approximately 230,189,727 $MtCO_2$/yr over 44 years. According to the IPCC (2013), this amount of CO_2 from just 2/11 of the fossil fuel energy sources analyzed by the IPCC and EPA (excluding

the multiple sources within the 5 other emissions sectors) would lead to unsustainable levels and could result in significant and irrevocable harm to society and the environment from negative impacts on the global climate. In fact, the IPCC (2001a, 2001b, 2007, and 2014) noted:

> "To achieve stabilization…the scenarios suggest that a very significant reduction in world carbon emissions per unit of GDP from 1990 levels will be necessary. The baseline SRES scenarios (for six gases included in the Kyoto Protocol) project a range of emissions of 11,500–14,000MtC_{eq} for 2010 and of 12,000–16,000MtC_{eq} for 2020." (IPCC 2001a).

> "Based on current understanding of climate-carbon cycle feedbacks, model studies suggest that stabilising CO_2 concentrations at, for example, 450ppm could require cumulative (global) emissions over the 21st century to be less than 1800 [1370 to 2200] $GtCO_2$, which is about 27% less than the 2460 [2310 to 2600] $GtCO_2$ determined without consideration of carbon cycle feedbacks." (IPCC 2007).

> "Multi-model results show that limiting total human-induced warming to less than 2°C relative to the period 1861-1880 with a probability of >66% would require cumulative (global) CO_2 emissions from all anthropogenic sources since 1870 to remain below about 2900 $GtCO_2$ (with a range of 2550-3150 $GtCO_2$ depending on non-CO_2 drivers). About 1900 $GtCO_2$ had already been emitted by 2011." (IPCC 2014)

To place this in context, if 1,900 $GtCO_2$.equivalent had already been emitted worldwide by 2011, the total *global* amount of *all* anthropogenic sources of CO_2.equivalent emissions that would be sustainable by the end of the 21st Century needs to be less than 1,000 $GtCO_2$.equivalent (IPCC 2014) – or 11.2359 $GtCO_2$.equivalent /year based on 89 years beginning in 2011. However, emissions based on a mean level of production leading to the end use of FLS 193 would add 10.128348 $GtCO_2$.equivalent from just 2/11 of the fossil fuel sources analyzed by the IPCC (2014). Such emissions are significant, add cumulative irrevocable impacts on the climate (IPCC 2014), and are not "negligible" as BOEM negligently contends. Two conclusions noted above by the IPPCC (2014) are important to reemphasize:

> "A large fraction of anthropogenic climate change resulting from CO_2 emissions is irreversible on a multi-century to millennial time scale, except in the case of a large net removal of CO_2 from the atmosphere over a sustained period."

> "Without additional mitigation efforts beyond those in place today, and even with adaptation, warming by the end of the 21st century will lead to high to very high risk of severe, widespread, and irreversible impacts globally (*high confidence*)."

The total CO_2 emissions from all sources in the US in 2010 was 5.433057 $GtCO_2$.equivalent (Department of Energy Carbon Dioxide Information Analysis Center 2014). In 2012, U.S. GHG emissions totaled 6.526 $GtCO_2$.equivalent (EPA 2014c). Therefore, at the 2012 EPA rate and without any mitigation or reduction efforts, if the global emissions remained below the necessary 1,000 $GtCO_2$.equivalent threshold concluded by the IPCC (2014), the US would therefore be contributing more than half (58.1%) of the annual *global* CO_2 emissions (11.2359 $GtCO_2$.equivalent/year based on 89 years beginning in 2011) by the end of the 21st Century. However, this is over the course of a century. Climate scientist Dr. Malte Meinshausen confirmed the IPCC data and that the current rate of global emissions is 33 $GtCO_2$/year, which means that the global carbon budget will be depleted within 30 years (Readfearn 2014) (emphasis added):

> "(F)rom 2011, the world could afford to emit no more than 1000bn tonnes (Gt) of CO_2 to have a good chance of staying below 2C of global warming (some poorer countries and low-lying states say the aim should be 1.5C)…***At current rates we churn through 33Gt a year – 1000Gt divided by 33 means we have about 30 years left from 2011 onwards. Then the carbon budget will be exhausted.*** At some point emissions have to go to zero, no matter what. There is no way around zero CO_2 emissions. As long as we continue to emit CO_2, the climate will continue to warm." (Readfearn 2014)

Examined on a 30-year time frame when the global carbon budget would be depleted, the total emissions from 90% of the end use of fossil fuels produced from FLS 193 would be 337,611,600 $MtCO_2$.equivalent/year over 30 years or approximately 1% of the annual global carbon budget. Considering this is from only one supply of all global emissions, FLS 193 would be a highly significant contribution that would add to cumulative impacts. Indeed, the total emissions produced from FLS 193 are far more significant in this context. Given the current global emission rate of 33 $GtCO_2$.equivalent/year, the total emissions from 90% (10.128348 $GtCO_2$.equivalent) of the end use of fossil fuels produced via just this one supply would ultimately contribute as much as 1/3 of the entire *global* carbon annual budget. Importantly, this is projected to be produced from only the *mean* oil and gas production resulting from one anchor field and one satellite via FLS 193.

BOEM's analyses also exclude Methane (CH_4), which is an extremely powerful and important hydrocarbon greenhouse gas with a GHG warming potential (GWP) of at least 25 times more than CO_2 over a 100-year period (EPA 2014d, WRI 2013) and at least 86-105 times stronger

over a 20-year time frame (IPCC 2013) – a significant increase from previous estimates of 72 times stronger over a 20-year period. The EPA (2014e, 2014f) estimated that more than 8.4 million metric tons of fugitive methane leaked from natural gas systems in 2011. Measured as CO_2-equivalent over a 100 year time scale, this equates to more GHGs than were emitted by all U.S. iron and steel, cement, and aluminum manufacturing facilities combined (WRI 2013). According to the EPA (2014g):

> "Globally, over 60% of total CH_4 emissions come from human activities…Natural gas and petroleum systems are the largest source of CH_4 emissions from industry in the United States. Methane is the primary component of natural gas. Some CH_4 is emitted to the atmosphere during the production, processing, storage, transmission, and distribution of natural gas. Because gas is often found alongside petroleum, the production, refinement, transportation, and storage of crude oil is also a source of CH_4 emissions."
>
> "Methane is a greenhouse gas that contributes to climate change. Thus, impacts from an accidental release of natural gas are inextricable with respect to the impacts from emissions of greenhouse gases during development and production."
>
> "Releases of natural gas include accidental releases as well as fugitive releases occurring from leakage. Natural gas is comprised of about 95% methane (CH_4), a powerful greenhouse gas…Releases from oil and gas systems are considered a major anthropogenic source of CH_4 in the United States."

Currently, the EPA uses earlier IPCC models (IPCC 2007) rather than the most current and robust data, models, and analyses from the IPCC (2013). Furthermore, by using a 100-year time scale, the EPA vastly underestimates the damage methane will cause to the climate in the next two decades when the global carbon budget is estimated to be depleted. The IPCC (2013, 2014) states that methane could push the climate over a "tipping point" in the next 18-25 years, causing irrevocable global warming, and making a 100-year timeline obsolete. Unfortunately, by combining a low GWP and an impractical 100-year time horizon, the EPA's methane estimate dilutes the impact of methane emissions.

In the Proceedings of the National Academy of Sciences, Alverez et al. (2012) reported that natural gas leakage rates based on operator-reported, daily gas production data at the study well sites ranged between 0 - 5%, with six sites out of 203 showing leakage rates of 2.6% or higher just from routine emissions. EPA studies reported by the EPA Office of Air Quality Planning and Standards (OAQPS 2014) show that at least 68% of 58,421 components studied were either leaking or venting gas. In the same OAQPS (2014) report, the total fugitive leaks from

pipelines totaled more than 13 million $MtCO_2$.equivalent, accounting for greater than 10% of total methane emissions from natural gas:

> "In 2012, the EPA reported that methane leaks from pipelines in the natural gas distribution sector accounted for more than 13 million metric tons of carbon dioxide equivalent emissions. These leaks are comprised of natural gas product, which is almost 100 percent methane, and account for more than 10 percent of total methane emissions from natural gas systems."

The New York Times recently reported that studies by Stanford are revealing there is already approximately 50% more methane in the atmosphere than previously estimated by the EPA, indicating that more methane is leaking from the natural gas production chain than previously thought (Davenport 2014). Currently, the preponderance of data and studies indicate that fugitive methane leaks from only routine maintenance problems, transport, venting, etc. range from 3% to as much as 10%, excluding more significant sources like blowouts. Therefore, when considering only the mean level of natural gas production from FLS 193 (76.77 trillion ft^3), the approximate amount of fugitive methane emissions resulting from FLS 193 would be 2,303,100,000,000 – 7,677,000,000,000 ft^3. This would equate to 125,288,640 – 417,628,800 $MtCO_2$.equivalent. Importantly, these figures only consider routine leakage and venting, etc. and exclude more serious leaks, blowouts, and explosions, for which BOEM (2014a) acknowledges numerous possible scenarios with impacts ranging from negligible to severe. However, BOEM (2014a) ultimately contradicts itself and states that, overall, the impact would be "negligible":

> "Methane is not a pollutant regulated by BOEM under 30 CFR 550.303(d), and releases, either accidental or because of leakage, would cause a negligible to minor impact on local air quality due to the toxic nature of CH_4."

It is very important to reemphasize a) the IPCC (2013) concluded that, without this additional source and at the current emission levels, the global carbon budget will be depleted within 30 years and, therefore, such an emission level of CO_2-equivalent in and of itself is unsustainable and b) these methane emissions are at least 25 times more potent than CO_2 over a 100-year period and at least 86-105 times more powerful over a 20-year time frame. Thus, when considering *only* the potential fugitive emissions of methane resulting from *only* the mean

production and transport of natural gas and routine leakage and venting, FLS 193 will be a highly significant single-source contributor to climate change and substantially add to cumulative effects. Clearly, BOEM's (2014) assessment is exceedingly narrow and limited and does not consider the full range of foreseeable direct and indirect impacts or local and cumulative effects. Based on these analyses alone, BOEM's (2014) Draft SSEIS assessment is highly negligent, arbitrary and capricious.

Producing oil and gas contributes to climate change locally and globally and, according to several legal precedents, NEPA, and the EPA, can no longer be narrowly considered a matter of only local activity emissions as BOEM negligently contends. Legally, the 77-year life span of FLS 193 is not taking a "hard look" at climate change and its impacts, causes and effects of GHG emissions, or cleaner (renewable) energy alternatives (see Jackson 2014). In fact, the IPCC (2014) stated that, at this point in time, fossil fuels must stay in the ground for the world to stay at or below the maximum amount of GHGs.

In November 2014, the United States formally agreed with China to reduce U.S. CO_2 emissions by 26-28% by 2025 (www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change). On 8 December 2014 a far more significant international agreement was formed in Lima Peru at the United Nations Climate Talks. According to the *Guardian* (*see* Readfearn 2014), "ADP 2-7 Agenda Item 3 - Elements For A Draft Negotiating Text", Section D (paragraph 13.2) outlines several long-term goals for a new global climate change agreement as supported by the UN, IPCC, the World Bank, and numerous member countries (emphasis added):

> "Parties' efforts to take the form of:
>
> a. A long-term zero emissions sustainable development pathway:
>
> Consistent with emissions peaking for developed countries in 2015, ***with an aim of zero net emissions by 2050***; in the context of equitable access to sustainable development…
>
> ***Consistent with carbon neutrality/net zero emissions by 2050, or full decarbonization by 2050 and/or negative emissions by 2100***…"

This language is scheduled to be the foundation for the Paris Climate Accords in 2015 and is supported by the IPCC (2014), the United Nations (2014), and the World Bank (2014):

> "Over the next year, countries will be developing their national commitments and contributions for the Paris agreement for lowering emissions and building resilience to climate change. To decarbonize economies on a trajectory necessary to reach net zero emissions before 2100, their commitments for mitigation and adaptation efforts will have to be ambitious." (United Nations 2014).
>
> "Several components are essential for a successful Paris agreement, each requiring ambitious commitment to building cleaner economies for the future…Binding language that should reinforce our collective ambition and provide a clear pathway to zero net emissions before 2100…Phasing out harmful fossil fuel subsidies, which are typically captured far more by the wealthy than the poor, is also overdue…" (World Bank 2014, *as cited* in United Nations 2014)

BOEM is obliged to support U.S. foreign policy goals regarding climate change. Pursuant to NEPA, U.S. Federal agencies are required to support initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in environmental quality (NEPA, Sec. 102 F-G):

> "(F) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment; (G) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment…"

Total production of oil and gas from FLS 193 will occur over 44 years (BOEM 2014a). Therefore, based on the 2010 and 2012 US Department of Energy and EPA emissions data noted above, the US reduction target would equate to 1.69676 -1.82728 $GtCO_2$.equivalent/yr or 74.65744 – 80.40032 $GtCO_2$-equivalent in *reduction* of CO_2 over the 44 years of FLS 193 production. However, the total amount of CO_2.equivalent emissions *added to the atmosphere* from the mean level of reasonably foreseeable oil and gas produced from the 44 years of production from FLS 193 would significantly contravene the 2014 US-China agreement for US emissions targets as well as the Lima and Paris climate agreements by *adding* an approximate mean of 10,128,348,000 $MtCO_2$.equivalent (10.128348 $GtCO_2$.equivalent). This amount, through its addition to the atmosphere, would negate a substantial 16.75– 18.04% of the U.S. - China agreed reduction target through added end use emissions rather than a reduction.

By any measure or standard, 10,128,348,000 $MtCO_2$.equivalent is not "negligible" as BOEM carelessly contends. BOEM's conclusion as such and its omission of this information are

significant abuses of discretion as well as unlawful according to NEPA. As a result, BOEM's Draft SSEIS (BOEM 2014a) misguides decision-makers and the public, leads to an uninformed choice of alternatives, and is highly negligent, arbitrary, and capricious (*see* Jackson et al. 2014; Grewal 2013 [*Center for Biological Diversity v. Bureau of Land Management*, No. 11-06174 (N.D. Cal. Dec 8, 2011)]).

According to the CEQ (2010, 2014) and a June 2014 precedent set by the US District Court of Colorado, "an EIS must disclose and evaluate all of the effects of a proposed action—direct, indirect, and cumulative" (Jackson 2014). Thus, BOEM is legally required by NEPA to examine all reasonably foreseeable direct and indirect impacts of its action. Clearly, BOEM's own assessments demonstrate the agency was well aware that mean recoverable oil and gas resources, which are significantly higher than the minimum used for its EIS analyses, are reasonably foreseeable and that the goal of FLS 193 is to "contribute significantly to the national energy supply":

> "The Chukchi Sea OCS is viewed as one of the most petroleum-rich offshore areas in the country, with geologic plays extending offshore from some of the largest oil and gas fields on Alaska's North Slope. BOEM's current petroleum assessment indicates a mean technically recoverable oil resource of 15.38 billion barrels (Bbbl) with a 5% chance of 40.08 Bbbl (BOEMRE 2011a). The mean undiscovered gas resources total 76.77 trillion cubic feet (Tcf) with a 5% chance of 209.53 Tcf. At these levels, the leasing of offshore areas within the Chukchi Sea may lead to development and production, and could contribute significantly to the national energy supply." (BOEM 2014a).

Furthermore, it is reasonably foreseeable that at least 90% of oil and gas predicted to be generated from FLS 193 will be burned as fuel (*see* Jackson 2014; Graffe et al. 2011). Graffe et al.'s (2011) salient assertion regarding BOEM's refusal to provide analyses relative to GHG emissions and climate change in BOEM'S previous EIS for FLS 193 remains fully relevant and applicable to this current Draft SSEIS:

> "BOEM's contrary conclusion is inconsistent with BOEM's own declaration of purpose in carrying out the action and with OCSLA. Both indicate that the ultimate objective of this lease sale is to develop energy supplies. The EIS cites the goal of — increased domestic energy supply in defining the — purpose and need of the lease sale. Ex. 3 at 17. *See also id.* (—[OCSLA's] purposes generally pertain to recognizing national energy needs . . . and addressing them by developing OCS oil and gas resources…). OCSLA directs the Secretary of Interior to schedule leasing in the way that, among other considerations, — will best meet national energy needs. 43 U.S.C. § 1344(a). BOEMRE's action is premised

> on an assumption that OCS oil and gas production will contribute to the national energy supply. *See supra* at 9. This is plainly inconsistent with a conclusion that use of this oil and gas as energy is unforeseeable. NEPA requires that BOEM make an effort to estimate, using generally accepted theoretical approaches, the greenhouse gas emissions from burning this oil and gas."

GHG emissions from the burning and combustion of oil and gas are considered both a direct effect on climate change (IPCC 2013) and an indirect effect of FLS 193 (CEQ 2014, Graffe et al. 2011). Importantly, "CEQ regulations define indirect effects as those caused by the action, [and] later in time or further removed in distance, [but] still reasonably foreseeable" (Graffe et al. 2011), including downstream sources by private individuals as noted above (CEQ 2014).

> "It is well-established in the Ninth Circuit that the effects of an action must be analyzed even if private activity is part of the chain of causation. Greenhouse gas emissions from burning oil and gas forecast to be produced are a reasonably foreseeable, proximate consequence of this lease sale. NEPA requires that BOEM analyze those emissions and their contribution to global climate change" (Graffe 2014).

According to both the Ninth Circuit Court of Appeals' remand decision of FLS 193 (*see* Fletcher 2014) and recent precedent by the US District Court of Colorado (*see* Jackson 2014):

> "…the agency (BOEM) cannot shirk its responsibility to 'consider[] all foreseeable direct and indirect impacts' of the proposed action in its EIS. *N. Alaska Envtl. Ctr.*, 457 F.3d at 975 (internal quotation marks omitted). The agency also must 'discuss[] . . . adverse impacts" without "improperly minimiz[ing] negative side effects.' *Id*" (Fletcher 2014).
>
> "This reasonably foreseeable effect (i.e. GHG emissions) must be analyzed, even if the precise extent of the effect is less certain" (Jackson 2014).
>
> "Reasonable forecasting and speculation is . . . implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA" (Jackson 2014).
>
> "(T)he decision to forgo calculating the reasonably foreseeable GHG emissions associated with the CRR (Colorado Roadless Rule) was arbitrary in light of the agencies' apparent ability to perform such calculations and their decision to include a detailed economic analysis of the benefits associated with the rule" (Jackson 2014).
>
> "…I am persuaded by an opinion from the Court of Appeals for the Eighth Circuit that rejected a nearly identical agency justification for not analyzing the future effects of coal combustion. In *Mid States Coalition for Progress v. Surface Transportation Board*, the court held that an agency violated NEPA when it failed to disclose and analyze the future coal combustion impacts associated with the agency's approval of a railroad line. 345 F.3d 520, 549 (8th Cir. 2003)." (Jackson 2014).

BOEM is guided by the Executive Office of the President through the CEQ and legally required by NEPA to ensure that this agency action is "fully informed and well considered" (CEQ 2010, 2014; Graffe 2011). Both the decision by the Ninth Circuit Court of Appeals regarding FLS 193 (*see* Fletcher 2014) and the 2014 precedent for a coal mine lease vacatur ruling by the US District Court of Colorado regarding identical lack of analyses and the foreseeable impacts on climate change (*see* Jackson 2014) support this:

> "*See Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008) (holding that NEPA requires agencies to analyze the effects of its actions on global climate change)" (Jackson 2014).
> "NEPA requires (that) (a)n agency must either obtain information that is 'essential to a reasoned choice among alternatives' or explain why such information was too costly or difficult to obtain. *Id.* § 1502.22" (Fletcher 2014)
>
> "*See* 40 C.F.R. § 1502.22(a) ((NEPA) stating that an agency 'shall' obtain additional information if it 'is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant')" (Jackson 2014).

However, BOEM consistently refuses to provide or disclose any data, calculations, models or other analyses in any of its EIS documents quantifying direct or indirect emissions. Nor does BOEM justify its assumption that the direct and/or indirect GHG emissions resulting from this action would be supposedly "negligible". BOEM does not provide its own decision-makers, the Federal government, the public, or other impacted nations with a fully informed or reasoned choice of alternatives as required by CEQ and the law under NEPA. BOEM's conclusion here and its decision to omit such analyses violate NEPA, are unlawful, and are negligent, arbitrary, and capricious as supported by precedent from the US District Court of Colorado (*see* Jackson 2014):

> "I find that the FEIS's proffered explanation for omitting the protocol (re: GHG emissions and climate change effects) was arbitrary and capricious in violation of NEPA."
>
> "Under the Administrative Procedure Act the Court is directed to hold unlawful and to set aside agency action found to be arbitrary, capricious or otherwise not in according to law. 5 U.S.C. § 706(2)(A). Thus, "vacatur" of the non-compliant agency action appears to be mandatory."

Therefore, Federal Lease Sale 193 is in direct violation of NEPA and the law and it is incumbent upon the federal government to vacate FLS 193 immediately and in its entirety or select Alternative II – No Lease Sale.

4) BOEM fails to analyze the substantial and significant social and economic costs of the reasonably foreseeable proximate impacts of GHG emission effects on climate change caused by the end use of FLS 193 oil and gas production.

In addition to failing to provide analyses regarding the environmental costs of greenhouse gas (GHG) and black carbon (BC) emissions as required by and in violation of NEPA, BOEM failed to analyze the substantial and significant social and economic costs of the reasonably foreseeable proximate impacts of GHG and BC emission effects on climate change caused by the end use of FLS 193 oil and gas production. According to a decidedly relevant June 2014 U.S. District Court of Colorado ruling (Jackson 2014):

> "NEPA further defines impacts or effects to include "ecological[,]…economic, [and] social" impacts of a proposed action."
>
> "EPA recommend(s) to the State Department to 'explore…means to characterize the impact of the GHG emissions, including an estimate of the 'social cost of carbon' associated with potential increases of GHG emissions.'"

The Council on Environmental Quality (CEQ 2014) further guides:

> "When an agency determines it appropriate to monetize costs and benefits, then, although developed specifically for regulatory impact analyses, the Federal social cost of carbon, which multiple Federal agencies have developed and used to assess the costs and benefits of alternatives in rulemakings, offers a harmonized, interagency metric that can provide decision makers and the public with some context for meaningful NEPA review."

Current EPA (2014j) models provide a range of social impacts from end-use GHG emissions using a low average of $28/ton (5% discount rate) to a high of $235/ton (95th percentile for a 3% discount rate) for the year 2050 (Table 1), which would be by the time FLS 193 is in full production if the lease were approved. The EPA (2014j) recognizes these models as the most current and acceptable methods for estimating the social costs of GHG emissions, particularly by the U.S. Interagency Working Group on the Social Costs of Carbon (IWGSC 2013). The IWGSC is composed of numerous U.S. Federal agencies and is recognized by the EPA as a leading authority on the social costs of carbon along with the IPCC:

* U.S. Council of Economic Advisers
* U.S. Council on Environmental Quality
* U.S. Department of Agriculture
* U.S. Department of Commerce
* U.S. Department of Energy
* U.S. Department of Transportation
* U.S. Environmental Protection Agency
* U.S. National Economic Council
* U.S. Office of Management and Budget
* U.S. Office of Science and Technology Policy
* U.S. Department of the Treasury

Table 1. The most recent Social Cost of Carbon
(SCC estimates (updated in 2013) every five years from 2015 – 2050 (from EPA 2014j).

	Discount Rate and Statistic			
Year	**5% Average**	**3% Average**	**2.5% Average**	**3% 95th percentile**
2015	$12	$39	$61	$116
2020	$13	$46	$68	$137
2025	$15	$50	$74	$153
2030	$17	$55	$80	$170
2035	$20	$60	$85	$187
2040	$22	$65	$92	$204
2045	$26	$70	$98	$220
2050	$28	$76	$104	$235

Based on these EPA (2014j) models for the mean GHG emissions (10,128,348,000 $MtCO_2$-equivalent) resulting from a mean level of production and conventional use of oil and gas from FLS 193, the approximate social cost of carbon (SCC) would be $283,593,744,000 – $2,380,161,780,000. Even at the minimum projected costs without the inclusion of other physical, economic, and ecological impacts in the models (EPA 2014j), and with just the mean level of production, the financial and social costs of FLS 193 are far in excess of all projected income, royalties, and financial benefits (estimated at ca. $140,671,965,000; BOEM 2014a) for the U.S. government, State of Alaska, and local communities combined. Not only is this cost range

exceedingly significant, particularly from just one supply source, but more sobering is the question: who will ultimately pay this cost?

Under current laws and regulations, neither the suppliers of these combusted fuels (i.e. Shell, ConacoPhillips, Statoil, et al.) nor the public end user will pay the cost. Rather, while the supplier will benefit substantially, U.S. and other nation's taxpayers along with the local communities that suffer the significant and substantial losses of personal property, treasure, income, and life due to the effects of climate change will ultimately pay the cost. Importantly, these costs are likely substantially higher. The models used to develop these EPA SCC estimates, known as "Integrated Assessment Models", do not currently include all of the major physical, ecological, and economic impacts of climate change (EPA 2014j). The EPA and IPCC (2007) along with the IWGSC (2013) acknowledge this reality and note "it is very likely that [SCC] underestimates the damages" (IPCC 2007 *as cited in* EPA 2014j).

For local Iñupiat subsistence communities, such losses also do not include the substantial added social and economic costs associated with loss of subsistence hunting, including impacts on local nutrient supplies (e.g. proteins, fats, and vitamins). The latter will exert a significant displacement impact on every family's economy, i.e. local communities will be forced to buy imported food at high prices *vs.* subsistence hunting and gathering of local resources. Subsistence is not simply a traditional socio-cultural activity encompassing every facet of life, which would be lost; it is a very real, necessary, and important financial and health issue. Indeed, their lives depend on it. In addition to the "*severe*" impacts on physical, psychological, emotional, and cultural well-being acknowledged by BOEM (2014a), when considered in its entirety, BOEM's analysts acknowledge that the impacts on local communities will be significant and major (i.e. "severe") (emphasis added):

> "***The impacts of the Scenario on subsistence-harvest patterns are expected to be up to major*** over the life of the project. This is due to disruptions in subsistence hunting from degradation of subsistence resources and use areas, and actual or perceived tainting from potential large oil spills, rendering the resources unavailable or undesirable for use….***When subsistence harvest patterns are adversely affected, sociocultural systems can in turn be impacted (major)***. Subsistence harvest patterns can be disrupted from routine activities during the Scenario or large oil spills…***The impacts of the Scenario on public and community health would range from minor to major depending on the phase and nature of the activity.*** These impacts are closely related to impacts on subsistence harvest patterns…These effects can cause increased demands on community services and increased stressors to local communities"

> "***Effects from a large oil spill could exacerbate existing cultural and economic stressors on local resource populations and local hunting, causing significant impacts to Russian (and Alaskan) Native coastal communities*** (Newell, 2004; Nuttall, 2005)."
>
> "If these resources are disrupted due to a discharge, food provided by the benthic community could become unavailable. If this occurs, food sources for humans and several other foraging specialists used for subsistence including walrus, gray whales, bearded seals, and spectacled eiders could realize impacts (Whitehouse, 2012)."

Although BOEM provides a relatively detailed, quantified, and highly favorable description of FLS 193 *financial benefits* in its Draft SSEIS (BOEM 2014a), it fails to provide sufficient and appropriate analyses of the social and environmental *costs*. Based on recent and highly relevant legal precedent, such failure and omission is arbitrary and capricious (*see* Jackson 2014) (emphasis added):

> "While the agencies provided an adequate disclosure of effects on adjacent lands, ***their treatment of the costs associated with GHG emissions from the mine was arbitrary and capricious.***"
>
> "Even though NEPA does not require a cost-benefit analysis, ***it was nonetheless arbitrary and capricious to quantify the benefits of the lease modifications and then explain that a similar analysis of the costs was impossible when such an analysis was in fact possible.***"
>
> "In effect the agency prepared half of a cost-benefit analysis, incorrectly claimed that it was impossible to quantify the costs, and then relied on the anticipated benefits to approve the project."
>
> "As plaintiffs point out, however, the proffered explanation that future activities are too speculative to analyze is belied by the agencies' decision to include detailed projections and analysis of tax revenue, employment statistics, and other environmental interests. CRR-0154023 at 0154350. ***It is arbitrary to offer detailed projections of a project's upside while omitting a feasible projection of the project's costs.***"
>
> "("***There can be no 'hard look' at costs and benefits unless all costs are disclosed.***"). In a nutshell, the agencies cannot claim that they are unable to predict the impacts of methane emissions because activities occurring under the rule are too speculative and then turn around and calculate down to the job and the nearest $100,000 the economic impacts of the rule."

Ultimately, BOEM's omission of detailed analyses of FLS 193 social and economic costs is a substantial failure, a blatantly arbitrary and capricious exclusion that significantly biases its assessment in favor of its preferred Alternative and the financial benefits of oil and gas production, and is an abuse of discretion. Therefore, Federal Lease Sale 193 should be vacated or Alternative II – No Lease Sale – selected.

5) The Affirmation Of Federal Lease Sale 193 Along With Conveyance Of $2.66 Billion To The United States Federal Government For FLS 193 Was Unlawful And Compromised the EIS Process

The significant government action of Federal Lease Sale 193 for $2.66 billion occurred, the monies conveyed to the U.S. Department of the Treasury, and the projected financial benefits were published prior to a) the agency giving this Federal action the requisite "hard look…at all foreseeable direct and indirect impacts of the proposed action" as required by law under NEPA, including during the lease sale process (*see* Fletcher 2014 et al., Jackson 2014; Grewal 2013) and b) definitive approval of a Final EIS (BOEM 2014a). According to Federal and court records, this significant and substantial sale and the arbitrary and capricious omissions were primary factors in the federal government's decision to a) approve the sale despite the known significant, severe, wide-spread, and long-lasting risks and negative impacts (Fletcher et al. 2014, Graffe et al. 2011), b) uphold the lease *vs.* rescinding the lease and the federal government's subsequent financial exposure from its i) legal obligation to buy back the lease and ii) loss of projected royalties in excess of $46 - $89 billion (Graffe et al. 2011, BOEM 2014a), and c) prejudiced its analysis in favor of financial gain *via* its preferred alternative of production despite the action's significant, long-term, wide-spread, and in some cases, severe and irrevocable environmental, social, and cultural harms.

Even though BOEM's Draft SSEIS (BOEM 2014a) provides a broader, but very basic range of possible effects than its previous drafts, BOEM's 2014 Draft SSEIS uses only the best case (i.e. minimal) production scenario due to the sale, which in turn biased all subsequent analyses to a best case impact assessment; minimized the negative effects; and occurred prior to a "hard look" at, and full consideration and analysis of, potential significant consequences (Fletcher et al. 2014).

> "BOEM considered only the *best* case scenario for environmental harm, assuming oil development. A best case scenario "skew[s]" the data toward fewer environmental impacts, and thus impedes a "full and fair discussion of the potential effects of the project." *Native Ecosystems Council v. U.S. Forest Serv.*, 418 F.3d 953, 965 (9th Cir. 2005) (citation and internal quotation marks omitted)" (Fletcher et al. 2014).

Although NEPA allows for more detailed analyses at later stages in the process, if there are no facts available during the lease sale, then later stage analysis as NEPA allows (e.g. during exploration or after development has begun) of missing or incomplete information that could

demonstrate significant negative impacts cannot provide a reasoned and appropriately informed choice for deciding whether or not the sale and potential harmful activities should even occur. According to both CEQ (2014) and the Ninth Circuit Court of Appeals (*see* Fletcher et al. 2014) "*(a)n agency is required to analyze the environmental effects in an EIS as soon as it is "reasonably possible" to do so*. *Kern*, 284 F.3d at 1072" (emphasis added).

Significant irrevocable impacts do occur prior to such analyses, such as with the Gulf of Mexico Deepwater Horizon disaster during its exploration phase. Exploration and all other stages of development have demonstrated that significant or catastrophic harm can occur in the much more difficult and dangerous offshore Arctic waters and environmental conditions. In other words, conducting more detailed environmental analyses only after activities have begun is too late. Without a fully detailed EIS of all direct, indirect, and cumulative impacts, the lease sale process a) cannot provide for reasonably informed decision-making, b) has been ruled to be an abuse of discretion (*see* Fletcher 2014 et al., Jackson 2014, Grewal 2013 [*Center for Biological Diversity v. Bureau of Land Management*, No. 11-06174 (N.D. Cal. Dec 8, 2011)], and c) is not based on consideration of relevant factors early enough to avoid disastrous and irrevocable consequences and irretrievable expense.

Furthermore, recommendations against proceeding along with warnings of flawed, unsupported, and assumptive analyses, and even "jeopardy" warnings – all by other federal agencies (e.g. EPA, USFWS, NMFS) – have been ignored and overruled before and after affirmation of FLS 193, including by the U.S. Secretary of the Interior (*see* Fletcher et al. 2014). In consideration of its remand decision, the Ninth Circuit Court of Appeals (*see* Fletcher et al. 2014) wrote regarding BOEM's previous Draft Supplemental EIS (emphasis added):

> "Numerous outside commentators expressed concern about the scenario BOEM had developed. For example, the Environmental Protection Agency wrote that the hypothetical development scenario that is used in the document add[s] additional layers of uncertainty regarding the probabilities of exploration, production and development activities and the risks associated with those activities…***EPA is concerned that, overall, the depth and diversity of uncertainties presented in the document resulted in the lack of adequate support for many of the document's conclusions***."

Although BOEM raised its minimum production estimate for its 2014 Draft SSEIS, it maintained the same scenarios and ambiguous and flawed impact analyses. Thus, the concerns expressed by

the EPA, USFWS, and the Ninth District Court of Appeals remain valid. By all accounts, Federal Lease Sale 193 was compromised from the start and should not be allowed to proceed.

According to the Ninth Circuit Court of Appeals remand decision regarding FLS 193, during a lease sale "the agency cannot shirk its responsibility to 'consider all direct and indirect impacts of the proposed action in the EIS'…The agency also must discuss adverse impacts without 'improperly minimizing negative side effects'" (Fletcher et al. 2014). In its essence, "(a)n agency must take into account all reasonably 'foreseeable significant adverse effects' of the proposed action in its analysis of environmental effects. 40 C.F.R. § 1502.22; *see also id.* § 1508.7…NEPA also requires an agency to analyze missing and incomplete information…(and)…obtain information that is "essential to a reasoned choice among alternatives'" at *all* stages of the process, including the lease sale stage (Fletcher et al. 2014, CEQ 2014). In addition, the CEQ (2014)states very clearly:

> "As called for under NEPA, the CEQ Regulations, and CEQ guidance, the NEPA review process should be integrated with planning at the earliest possible time."

Simply, BOEM failed to provide sufficient information for a reasoned choice of alternatives in any of its draft EIS documents prior to or after Federal Lease Sale 193. Several recent US District Court, Federal Magistrate, and Circuit Court of Appeals precedents support this fact (*see* Fletcher et al. 2014; Jackson 2014; Grewal 2013). The Ninth Circuit Court of Appeals remand decision regarding FLS 193 specifically stated (*see* Fletcher et al. 2014) (emphasis added):

> "NEPA 'protect[s] the environment by ***requiring that federal agencies carefully weigh environmental considerations and consider potential alternatives to the proposed action before the government launches any major federal action.***' *Barnes v. U.S. Dep't of Transp.*, 655 F.3d 1124, 1131 (9th Cir. 2011) (internal quotation marks omitted). 'NEPA imposes procedural requirements designed to force agencies to take a 'hard look' at environmental consequences' of major federal action. *Id.* (quoting *Earth Island Inst. v. U.S. Forest Serv.*, 351 F.3d 1291, 1300 (9th Cir. 2003)). The statute requires federal agencies to 'consider every significant aspect of the environmental impact of a proposed action' and to 'inform the public that [they] ha[ve] indeed considered environmental concerns in [their] decisionmaking process.' *Balt. Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983) (internal quotation marks omitted)."
>
> "***Under NEPA, BOEM is required to take into account the full environmental effects of its actions when deciding whether and in what manner to pursue the lease sale.*** 42 U.S.C. § 4332(2)(C). ***A later project or site-specific environmental analysis is an inadequate substitute for an estimate of total production from the lease sale as a whole***."

> "***It is only at the lease sale stage that the agency can adequately consider cumulative effects of the lease sale on the environment, including the overall risk of oil spills and the effects of the sale on climate change. It is also only at the lease sale stage that the agency can take into account the effects of oil production in deciding which parcels to offer for lease.***"

It is certain that, in and of itself, offering Federal Lease Sale 193 for oil and gas development on 29.4 million acres of U.S. public property is a "major federal action". It is also certain that the U.S. government's proceeding with and affirming this sale along with the conveyance of $2.66 billion by several of the world's largest and most powerful corporations (Shell, ConacoPhillips, Statoil, et al.) to, and its deposit by, the United States Department of the Treasury also constitute "major federal action(s)". An EIS must be conducted assuming no leases have been sold. The fact that these major Federal actions occurred prior to the responsible Federal agency (BOEM) examining and providing the public "'all foreseeable direct and indirect impacts' of the proposed action in its EIS" (Fletcher et al. 2014) for a reasoned choice of alternatives is unlawful, an abuse of discretion and authority (Fletcher et al. 2014; Jackson et al. 2014; Grewal 2013) and violates CEQ (2014, 2010) regulations as well as BOEM's (2014) own policies (Figure 1).

Figure 1. Federal Bureau of Ocean Energy Management (BOEM) lease sale process relative to final EIS (BOEM 2014b - http://www.boem.gov/Five-Year-Program/).

This sale should be held only *after* definitive approval and publication of the Final EIS and *after* all comments and legal actions have been addressed and all identified problems and foreseeable impacts mitigated. Although a "Final EIS" was published in 2007 prior to the sale and again in 2011, both were wholly insufficient and subject to scrutiny, legal action, and remand as ruled by Federal court. Yet, the sale was held prior to a) providing the public and decisions-makers

with sufficient information and analyses regarding all foreseeable direct, indirect, and cumulative impacts, b) addressing and mitgating all identified problems and foreseeable impacts, including those ruled by Federal court, and c) before a definitively and legally approved Final EIS that provides such information and is available for scrutiny, which remains unpublished and unavailable nearly 7 years after the sale.

Basing EIS analyses on missing, uncertain or incomplete information for a Federal lease sale is highly negligent and has been ruled to be unlawful, arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law (*see* Fletcher et al. 2014, Jackson et al. 2014, Grewal 2013, and numerous precedents cited therein). To permit a Federal lease sale to proceed and with significant monies exchanged without sufficient information to base informed decision-making has compromised the environmental impact assessment process and is also unlawful, arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law. Therefore, Federal Lease Sale 193 should be vacated immediately and in its entirety or Alternative II – No Lease Sale – should be selected.

6) BOEM's Impact Analyses Are Biased, Subjective, Ambiguous, Inconsistent, Arbitrary And Capricious.

BOEM does not analyze the proposed FLS 193 actions' impacts *via* a quantifiable metric or scale and does not provide the public, Federal or State agencies, or other impacted nations any data or rationale for its analyses. Instead, BOEM a) uses an inadequate, biased, ambiguous, inconsistent, and subjective assessment, b) grossly minimizes the environmental impacts of the proposed action, c) contradicts its own analyses in favor of the preferred alternative to maintain the sale and develop the resources, and d) fails to provide sufficient information for an informed choice of alternatives.

BOEM's description of its impact scale in its Draft SSEIS (BOEM 2014a) is extremely brief and devoid of detail or sufficient explanation:

> "The impacts scale applied in the Draft Second SEIS is as follows:
>
> - **Negligible:** Little or no impact
> - **Minor:** Impacts are short-term and/or localized, and less than severe
> - **Moderate:** Impacts are long lasting and widespread, and less than severe
> - **Major:** Impacts are severe"

There are no details, data, accompanying information, science, quantifying metric(s), or other information in this Draft SSEIS to inform the reader what this "scale" is based on or how it was derived. BOEM attempts to excuse this exceedingly subjective assessment in its Draft SSEIS by claiming it "considered approaches of other Federal agencies" (BOEM 2014a). But, such a rationalization a) does not substantiate the validity of these other approaches nor of BOEM's own flawed scale and b) is specious in and of itself, particularly in light of the fact that BOEM developed its own scale regardless.

In addition, BOEM does not sufficiently consider the highly interdependent synecological and food web dynamics that have significant effects in the Arctic (e.g. disturbance to and/or loss of prey and habitat). Impacts on these levels can not only significantly affect individual populations and species, but the ecosystem as a whole. If these effects were given more serious consideration as required by law, the impacts of FLS 193 would be shown to be more significant and could be analyzed and considered with more cogent information and much greater scrutiny.

However, BOEM's impact analyses are qualitative at best and the agency relies solely on its analysts' "professional judgment", but does not provide any information on who the analysts are nor on their professional background, experience, expertise, or position. It is highly dubious that BOEM employed or contracted different specialists with expertise not only for every species, sector, culture, and subject impacted, but each who are also specialists regarding anthropogenic impacts on their respective subject. If BOEM did in fact employ or contract all such experts, then it is incumbent upon the Agency to provide detailed information supporting that individual's expertise and qualifications to make such "professional judgment(s)". In addition, it is clear that either a) different analysts apply their own *subjective* "judgment(s)" on the same subject or species in different sections of the Draft and contradict other sections and/or analysts, or b) the same analyst(s) contradict themselves. This Draft SSEIS is replete with myriad contradictions.

For example, BOEM analysts subjectively assume that with some species a large spill may "only" result in "Moderate" or even "negligible" impacts (e.g. polar bears, walrus), yet the population would suffer irreversible declines. How is the decline and eventual loss of an entire population assumed to be merely "negligible" and not considered "severe"? Furthermore, BOEM's "analyses" of impacts on a species in some Draft SSEIS (BOEM 2014a) sections are *assumed* to be supposedly "Minor", "negligible", or "Moderate", with supposedly minimal or no population impacts, yet the same spill scenario in other sections describes the *same* impacts for the *same* activities during the *same* exploration, production, or development phase on the *same*

species as causing "Major" population declines, behavioral changes, or movement shifts and determines these as "severe". Such specious "analyses" are not simply "subjective" or "qualitative"; they are wholly arbitrary and capricious.

This not only demonstrates the inadequacy of this scale, but also the fact that much of the information provided in this Draft is flawed, assumptive, unsupported, subjective, dubious, arbitrary, and capricious. As such, BOEM's Draft SSEIS (BOEM 2014a) a) does not take an objective and robust "hard look" at all possible direct, indirect, and cumulative impacts, b) does not provide for a fully informed and reasoned choice of alternatives, and c) does not comply in any manner with NEPA rendering the analyses highly negligent and FLS 193 illegal.

Importantly, how does BOEM actually quantify "severe" or accurately distinguish this category from others? According to the New Oxford American Dictionary, "severe" means: "(of something bad or undesirable) very great; intense; strict or harsh." How then, does BOEM apply "of something bad, undesirable, strict, harsh," etc. in any scientific form? How do BOEM analysts substantiate not using the "severe" category when a species' population in the FLS 193 area suffers "significant impacts", "large losses" or "conspicuous population level effects" according to their own assessment (BOEM 2014a)? How does BOEM actually distinguish this scientifically or otherwise from "impacts (that) are long lasting and widespread" yet are supposedly "less than severe"? Indeed, how can a Federal agency tasked with managing U.S. publicly owned natural resources, including endangered species, claim that "conspicuous population-level effects" or that (a)ll birds or polar bears contacted by crude oil "are assumed to die" (BOEM 2014s) are not "severe", "something bad" or "undesirable"? In some cases, BOEM (2014a) predicts a "Major" impact that is "less than severe", but "Major" is supposedly "severe" according to their scale as noted above (emphasis added):

> "Overall, the activities conducted during this time period are anticipated to have a ***major*** impact on marine and coastal birds, including threatened and endangered marine and coastal birds, because they are long lasting and widespread, but less than severe."

Numerous examples of such discrepancies abound in BOEM's Draft SSEIS. For example, BOEM analyst(s) conclude "significant" population level impacts on polar bears (emphasis added):

> "Some OCS operations might pose a ***relatively high spill risk*** to polar bear aggregations and, therefore, ***to the polar bear population as a whole***"
>
> "Were oil to contact one of these aggregations of bears, it would likely result in mortalities and constitute a ***significant impact*** to the SBS or CBS stock of polar bears."

> "If a VLOS (Very Large Oil Spill) were to occur, it could result in the ***loss of large numbers of polar bears. This would have a significant impact*** on the SBS and/or CBS stocks of polar bears."

However, BOEM (2014a) analyst(s) determined that the impacts on polar bears are supposedly "Moderate" or even "negligible" via a misleading and false argument, including in their cumulative impacts analyses (Table 2).

Table 2 (from Table 5-18 in Draft SSEIS (BOEM 2014a). "Summary of Analyzed Effects That May add to Incremental Effects on Marine Mammal Species Effects."

Beluga Whale	Moderate
Bowhead Whale	Moderate
Fin Whale	Negligible
Gray Whale	Moderate
Harbor Porpoise	Moderate
Humpback Whale	Negligible
Killer Whale	Moderate
Minke Whale	Moderate
Bearded Sea	Moderate
Ribbon Seal	Moderate
Ringed Seal	Moderate
Spotted Seal	Moderate
Pacific Walrus	Moderate
Polar Bear	Negligible

First, BOEM's argument is highly presumptive and does not provide any data, science, theory, or information of any kind to base its conclusions for any of these species. Second, BOEM (2014a) states clearly that winter spills will affect polar bears and numerous other species:

> "Much of the high level of activity during the Exploration and Development phase predicated in the Scenario is focused during the open water season when polar bears are not likely to be present. Polar bears are more likely to be present during the winter season and during the production phase. Because polar bears commonly move through oil industry areas on the North Slope and in the Beaufort Sea with ***only negligible impacts,*** it is likely that activity in the Leased Area would cause ***negligible impacts***." (BOEM 2014a)

Furthermore, BOEM's argument that large and very large spills occurring in Spring, Summer, or Fall when BOEM analysts subjectively assume polar bears are supposedly "not likely to be present" is ?lawed because a) the bears will be forced ashore at this time and will have a strong presence along spill-impacted coastal zones where dead and dying prey will be scavenged and b) the spills will have a strong probability of remaining through the winter with as much as a 79% probability of contact with bears within 360 days, causing significant harm. According to BOEM (2014a) (emphasis added):

> "As demonstrated by this spill, small, chronic leaks in underwater pipelines could result in large volumes of oil being released underwater without detection. ***If such an event were to occur in offshore waters, there could be major impacts to the polar bear population***. If such a spill occurred during winter, ***the release of oil trapped under the ice during spring breakup would be equivalent to the catastrophic release of the same amount of oil*** (Amstrup, Durner, and McDonald, 2000)".
>
> "(I)f a spill were to occur late in the open water season, the liquid hydrocarbons may freeze into the sea ice, and could remain overwinter without any extensive amount of weathering. If this were to happen, ***quantities of unweathered oil could end up being transported to different areas in the Chukchi and Beaufort Seas and be released in the spring.***"
>
> "The OSRA model estimates the percent chance of a large spill contacting the ERAs and coastal areas that are important resource areas to polar bears. The OSRA model estimates the percent chance of a large oil spill contacting ERA 23 within 30 days is 3-70% for all LAs and 10-78% for all PLs. The percent chance of a large oil spill contacting ERA 23 within 360 days is 6-71% for all LAs and 13- 79% for all PLs."

Importantly, the IUCN Species Survival Commission Polar Bear Specialist Group (PBSG 2014) concluded that 21% of the polar bear subpoplations are in decline, including the Southern Beaufort Sea subpopulation.

> "The SB subpopulation is currently considered to be declining due to a negative trend in sea ice conditions, particularly over the continental shelf, resulting from the continuing effects of climate warming. If the region continues to lose high quality polar bear hunting habitat as forecasted by global climate models (Durner et al. 2009), it is likely that the SB subpopulation could face extirpation by mid-century (Amstrup et al. 2010). (PBSG 2014)"

In addition, the PBSG concludes that two-thirds of all polar bears could be lost by the middle of the century and possibly the entire population by the end of the century due to oil and gas development, pollution, and climate change impacts and loss of sea ice extent, prey, denning sites, etc. (PBSG, 2014, Schliebe et al. 2008). Clearly, substantive perturbations on any one

subpopulation could be highly detrimental, including to the population as a whole. Yet, BOEM (2014) analyst(s) subjectively concluded without any quantifiable data, evidence, analyses, science, or information that the direct, indirect, and cumulative impacts on polar bears from activities associated with FLS 193 would be "negligible" according to BOEM's impact scale.

Third, BOEM's assessment is flawed and highly misleading. For example, BOEM (2014a) acknowledges that some polar bear subpopulations are "in decline" and that further perturbations could have significant impacts. Given that "some OCS operations might pose a relatively high spill risk to polar bear aggregations" (BOEM 2014a) and that there is as much as a 79% chance of a spill contacting polar bears, which would have "significant impacts" on the population as whole (BOEM 2014a), clearly this is not "negligible" and, in fact, should be categorized as s*evere*. Yet, a reader examining this document in other sections is informed by BOEM that the impacts are considered inconsequential, "minor" or "negligible", including in BOEM's cumulative effects analysis (Table 2). The latter is flawed and misleading. BOEM states in its Draft SSEIS (BOEM 2014a) that future exploration, development and production are reasonably foreseeable *via* future lease sales in the Chukchi Sea and that "industry interest will remain focused ('within the core leasing area') for the foreseeable future" (emphasis added):

> "To inform the cumulative effects analysis, BOEM estimated how much exploration, development, and production could occur from reasonably foreseeable future lease sales in the Chukchi Sea. During this exercise, BOEM focused on the areas leased in Lease Sale193 as well as nearby tracts within the "core" leasing area of the Chukchi Sea. ***This core area contains the most promising prospects,*** and was the focus of leasing in Lease Sale 109 as well as Lease Sale 193 and ***is expected to be an area of industry focus in potential future lease sales***. ***Therefore, this is the area where BOEM expects that industry interest will remain focused for the foreseeable future***."
>
> "Using data from actual prospects to more accurately develop the proxy fields analyzed here, BOEM estimated the additional 2.0 Bbbl of production attributed to future lease sales could occur from two additional satellite fields. These two satellite fields would contribute 1.6 Bbbl and 0.4 Bbbl of recoverable oil, respectively. Production would also include 1.7 TCF and 0.2 TCF of recoverable gas from these two satellite fields, respectively. Developing these fields would require 6 additional platforms and 360 additional production and service wells."

As such, if there is a 75% probability of one or more large spills occurring from the development of only one anchor field and one satellite field for FLS 193, then obviously as the National Research Council clearly warns: the probability of more spills occurring increases with future lease sales and subsequent activities (NRC 2014). Indeed, "(d)evelopment of these fields

(for FLS 193) would entail the drilling of 465 oil producing wells, 93 service wells, and installation of 8 platforms… (with) a 75% chance of one or more large spills occurring" (BOEM 2014a). The impacts of adding a *minimum* 6 additional platforms and (64.5%) an additional 360 production and service wells from future leases clearly will increase the probability of adding more spills and disturbances to the system (NRC 2014). Indeed, BOEM clearly states in its Draft SSEIS (BOEM 2014a) that there is "***considerable historical data"*** indicating larges spills ≥1,000 bbls may occur during Development and Production (emphasis added):

> "Two large spills of crude, condensate, or refined oil are assumed to occur during the Development and Production phases. ***This assumption is based on considerable historical data that indicates large spills ≥1,000 bbls may occur during this phase*** (Anderson, Mayes and Labelle, 2012). This assumption is also based on statistical estimates of the mean number of large spills from platforms, wells, and pipelines, the number and size of large spills on the OCS, and project-specific information."

In reality, the probability of a large spill occurring is likely higher and the possibility of effective emergency response is absent. BOEM acknowledges in its Draft SSEIS (BOEM 2014a) the predicted cumulative effects (emphasis added):

> "Cumulative effects may include the development of offshore oil production other than the Chukchi Sea Leased Areas (i.e. Canada and Russia development), onshore oil and gas production and subsequent construction and maintenance of infrastructure, onshore mining, and other similar activities such as trenching for telecommunication development. ***These activities would create further effects of discharges from nonpoint sources, sedimentary displacement and deposition, potentials for hydrocarbon spills and natural gas releases, noise due to vessel traffic, and activities that could further increase cumulative effects on the Chukchi Sea Leased Areas***."
>
> "There is a lack of accident response resources in the Arctic as well as a lack of effective techniques for containing or cleaning up spilled oil under ice or in broken ice. There are also challenges of associated with conducting a rapid, effective spill response in a region where weather is often severe, daylight may be limited, and accidents may happen in remote locations (AMAP 2007)."

BOEM's rudimentary analyses show only the probability of a given number of events occurring in a fixed interval of time and/or space if these events occur with a known average rate and independently of the time since the last event (i.e. a Poisson distribution) and do not account for other significant confounding effects, particularly human error (e.g. Deepwater Horizon

disaster, Exxon Valdez disaster, etc.) sea, ice, weather, climate, and other environmental conditions – as well as the lack of accident response resources in the region. BOEM's simplified analyses are based only on historical data of the mean number of spills that have occurred during other outer continental shelf (OCS) operations, which on average, have occurred in calmer and easier weather, sea, and environmental conditions compared to the Arctic (NRC 2014). In the much more difficult and dangerous offshore Arctic conditions, all oil and gas activities have demonstrated that significant or catastrophic accidents and harm can occur. Clearly, with the addition of at least 64.5% more wells from future leases, the probability is significantly higher for the occurrence of one or more large spills, industrial accidents, blow-outs, ship groundings, pipe bursts, etc. in addition to significantly more smaller spills, toxic discharges, construction, production, invasive species, human, industrial and transportation activities, and disturbance (NRC 2014) – all together with and exacerbated by the effects of climate change.

The preponderance of independent evidence-based scientific studies has led to the broadly accepted ecological principle that such impacts are generally synergistic. In essence, additional disturbances can compound the effects exponentially on species and populations – particularly those already threatened or endangered – that were previously impacted by earlier perturbations (e.g. disturbances, spills, etc. from oil and gas exploration, production, development and other activities) and/or other stresses on their populations. BOEM acknowledges in various sections of the document that such species could suffer "population-level" declines due to the various disturbances caused by FLS 193. As BOEM repeats multiple times throughout this Draft SSEIS (BOEM 2014a): "(i)n a declining population, losses are not recovered by recruitment." In fact, as BOEM itself notes with regard to the Pacific walrus, which is a candidate species for the Endangered Species Act and, as such, is afforded relevant protections, the population is already in decline due to loss of sea ice and prey availability. Further loss if individuals or habitat resulting from any perturbation, whether oil spills, climate change, or prey loss, would "exacerbate that decline" (emphasis added):

> "***With a population in decline, any loss of large numbers of walruses, walrus habitat, or prey species would exacerbate that decline***. Recovery would not occur unless the population begins to rebound from other factors that may be limiting population productivity or growth, such as decreasing sea ice extent, prey availability or harvest."
>
> "Walrus may continue to be exposed to hydrocarbons through their prey, which may lead to ***reduced fitness and possibly population-level effects over time***."

> "***Significant impacts to the walrus population would be most likely to occur if large scale contamination of prey and habitat persisted for years***; or if a VLOS contacted a large concentration of walrus at a foraging area…"

With regard to both common and Federally listed endangered eiders, BOEM (2014a) notes that "(c)hronic disturbances to nesting spectacled eiders would be widespread and would persist throughout the 24-year period".

> "***Should any population decline, the potential impact to that species could increase***. Several seaduck populations have experienced periodic declines (e.g., king eider, common eider) and the potential impact to those species could increase. ***Chronic disturbances to nesting spectacled eiders would be widespread and would persist throughout the 24-year period.***"

Cumulative impacts can affect these and myriad other species with the addition of new spills and other perturbations. BOEM (2014a) notes the possible effects in its cumulative impact analyses:

> "This analysis employs the definition of cumulative impacts found in the CEQ regulations (40 CFR 1508.7): 'Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. ***Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time***.' ***Cumulative effects are assessed by determining the incremental impact of the action when added to the impacts of past, present, and reasonably foreseeable future actions in the vicinity of the project.***"

If a large or very large spill were to occur or a series of smaller spills, which BOEM (2014a) estimated to number at least 800, combined with disturbance from the numerous disruptive activities associated with 558 wells, exploration, construction, production, sea and air transport, pipeline, and other oil and gas activities, etc. from FLS 193, species already "significantly" impacted or experiencing declines could suffer irrevocable harm from the addition of 360 more wells, probable spills, new disturbances, etc. from future leases. In addition, BOEM's analyses do not account for large/very large spills occurring in adjacent leases, the Beaufort and Bering Seas, Russia, or Canada. It is simply misleading and erroneous to use this subjective scale and personal "judgment" to contend that the addition of substantive new impacts and perturbations would have supposed "negligible" effects. Because it is a Federal agency, it is possible much of BOEM's analyses in any of its documents could be taken at face value, including Table 5-18 in its

2014 Draft SSEIS (Table 2 above). In the absence of more detailed analyses and information it can be difficult to distinguish the contradictory, flawed, and misleading information in BOEM's Draft SSEIS (BOEM 2014) from robust, valid, evidence-based, and well-supported scientific analyses.

Furthermore, BOEM minimizes potential impacts by suggesting that future mitigation measures would compensate for effects, but such an assertion is spurious as well as arbitrary and capricious. As noted by the U.S. District Court of Colorado (*see* Jackson 2014) (emphasis added):

> "(T)he agencies' contention that new technology might reduce carbon emissions from future coal combustion strikes this Court as anything but a "hard look." ***The agency cannot rely on unsupported assumptions that future mitigation technologies will be adopted.*** *Cf. New York v. Nuclear Regulatory Comm'n*, 681 F.3d 471, 478-79 (D.C. Cir. 2012) (finding a NEPA violation where the agency decided to ignore future impacts based only on "reasonable assurance[s]" that the impacts would be avoided later); *see also Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1381 (9th Cir. 1998) (***holding that an EIS discussion of mitigation violated NEPA in part because it was "not clear whether any mitigation measures would in fact be adopted***").

Ultimately, BOEM's impact and cumulative effects assessments are misleading, flawed, highly subjective and biased, negligent, arbitrary, capricious, and an abuse of discretion and authority. Furthermore, BOEM's assessments do not provide an accurate and appropriately well-informed representation of reality and reasoned choice of alternatives. As such, FLS 193 must be vacated or Alternative II – No Lease Sale – must be selected.

7) The U.S. Department of the Interior, U.S. Department of the Treasury, and BOEM affirmed the sale of Lease 193 despite the fact that federally listed and candidate endangered species would suffer significant, long-term, conspicuous, and/or widespread population-level losses and irreparable harm as a result of the proposed action.

The United States Department of the Interior, the United States Department of the Treasury, and BOEM proceeded with, affirmed, and accepted $2.66 billion for the sale of Lease 193 in favor of its preferred alternative to develop oil and gas resources on public property despite its own conclusions as well as warnings by the USFWS, EPA, NOAA, and NMFS that numerous species, including Federally listed and candidate Endangered/Threatened species and their critical habitats, would suffer "significant", "long-term", "wide-spread", "conspicuous", "large-scale", and "Major" (i.e. "*severe*") "population-level impacts" and irreparable harm as well as by the cumulative impacts from future leases. Based on these warnings and conclusions alone, it was highly negligent and illegal for BOEM to knowingly proceed with Federal Lease Sale 193.

It is well-worth emphasizing that the extraordinarily high probabilities of polar bears and walrus and, thus, numerous other species contacting a large or very large oil spill are 79% and 76% respectively. In light of BOEM's own statements and conclusions in its Draft SSEIS (BOEM 2014a) with regard to just these two Federally listed/candidate species as well as Endangered eiders, the impacts of FLS 193 are extremely serious. According to the law under the U.S. Endangered Species Act, Federal action FLS 193 must be retracted and vacated. BOEM's own review of the impacts on these species is highly relevant despite its attempt to minimize the effects in other portions of the document (BOEM 2014a) (emphasis added):

Polar Bears

> "***(O)nce oiled, it is unlikely that an oiled bear would survive.***"
>
> "Long term or chronic oil ingestion may result in kidney damage, liver damage, or ulcers in the digestive tracts of seals and the polar bears that feed upon them."
>
> "If polar bears avoid coastal areas that have been fouled by oil, ***they may be excluded from important resting or denning areas, which may impact fitness or breeding success.***"
>
> "If the spill begins late in the open water drilling season (September to October), then the longer that the spill goes on, the more likely it becomes polar bears would encounter oil and/or disturbance from cleanup efforts. In recent years, more polar bears have congregated on shore while waiting for the sea ice to form. Large aggregations of bears from the SBS stock now occur near Cross Island and Barter Island, where bears scavenge on whale carcasses. Wrangel Island also has large numbers of bears from the CBS stock.

> ***Were oil to contact one of these aggregations of bears, it would likely result in mortalities and constitute a significant impact to the SBS or CBS stock of polar bears.***"
>
> "After cleanup efforts have ceased, the remaining oil would continue to weather and be subject to microbial degradation. This process is likely to be very slow in Arctic waters. Oil that has been suspended in the water column or in the sediment may continue to be ingested by the benthic organisms that bearded seals and walrus prey upon…***Polar bears that are eating bearded seals or walrus may continue to be exposed to hydrocarbons through their prey, which may lead to reduced fitness over time.***"
>
> "The majority of the CBS (polar bear) stock is believed to den and come ashore on the Russian side of the Chukchi Sea, particularly at Wrangel Island. The majority of the SBS stock of polar bears come ashore and den further eastward in the Beaufort Sea. However there is a large area of overlap between the CBS stock and the SBS stock out on the sea ice in the northeastern portion of the Chukchi Sea. ***Both stocks are believed to be in decline. If a VLOS*** (very large oil spill) ***were to occur, it could result in the loss of large numbers of polar bears. This would have a significant impact on the SBS and/or CBS stocks of polar bears.***"
>
> "Large spills up to 5,100 bbl could impact polar bears, particularly if they occurred in marginal sea ice habitat or onshore near barrier islands. ***Impacts could include disturbance and displacement; inhalation of contaminants; eye, mouth or mucous membrane injuries; or ingestion of contaminated prey. Oiled polar bears would likely ingest oil during grooming efforts and would be susceptible to hypothermia. Heavily oiled bears would not survive*** unless capture and cleaning efforts were successful. ***Polar bears that ingest contaminated prey could suffer injury or mortality due to liver and/or kidney damage. Cleanup activities may haze polar bears away from contaminated sites, but ingestion of contaminated prey over time would be difficult to mitigate.***"
>
> "Depending upon the location of the spill site and other factors, ***oil could contact shore within 10 days of the initial event."***
>
> "***As demonstrated by this spill, small, chronic leaks in underwater pipelines could result in large volumes of oil being released underwater without detection. If such an event were to occur in offshore waters, there could be major impacts to the polar bear population. If such a spill occurred during winter, the release of oil trapped under the ice during spring breakup would be equivalent to the catastrophic release of the same amount of oil (Amstrup, Durner, and McDonald, 2000).***"
>
> ***"Spills during the fall or spring during the formation or breakup of ice present a greater risk because of difficulties associated with clean up during these periods and the presence of bears in the prime feeding areas over the continental shelf (USFWS, 2006). Oil would remain highly toxic to polar bears, even after the aromatic hydrocarbons have dissipated (St. Aubin 1990)***."
>
> "***Some OCS operations might pose a relatively high spill risk to polar bear aggregations and, therefore, to the polar bear population as a whole***."
>
> "***Large aggregations of polar bears may be vulnerable to a spill*** along the arctic coasts or on Wrangel or Herald islands in late summer and fall, when they congregate in these areas to feed on walrus and whale carcasses (USFWS, 2006). ***Indirect sources of mortality may occur when seals or other mammals die from oil exposure***."

Marine and Coastal Birds, Including Endangered Eiders

> "***All birds contacted by spilled fuel or crude oil are assumed to die.***"
>
> "***A VLOS (very large oil spill) during periods of peak use could affect large numbers of marine and coastal birds***, including loons, seabirds, and waterfowl including listed eiders. ***As a typical example, up to 45% of the estimated Pacific Flyway population of Pacific brant could be affected***, if an oil spill reaches Kasegaluk Lagoon. Effects could range from ***direct mortality of approximately 60,000 brant*** to sublethal effects on an equal or smaller number of brant. ***The loss of up to 45% of the Pacific Flyway population would have conspicuous population-level effects."***
>
> "***The loss of all or part of the breeding female spectacled eiders of the Arctic Coastal Plain would be anticipated to result in large-scale population level effects. A similar impact could be experienced by Steller's eiders using the spring lead system*** for staging prior to moving to the breeding grounds. A large spill contacting the spring lead system could affect a relatively large proportion of the Steller's eider population. ***This would be considered a large-scale population-level effect on this species.***"
>
> "As many as 33,000 eiders, including the entire cohort of successfully breeding females and their young, use the Ledyard Bay molting area at one time. ***The loss of all or part of the breeding female spectacled eiders of the ACP would result in a major impact to this species***."
>
> "For many of the same reasons, ***a spill contacting the spring lead system could affect a relatively large proportion of the Steller's eider population staging enroute to the breeding grounds. A spill of this magnitude would result in a major impact on this species because they are clear, long-lasting and change the resource's function in the ecosystem.***"
>
> "Several other ***seaduck populations have experienced periodic declines*** (e.g., king eider, common eider) and ***the potential impact to those species could increase. In a declining population, losses are not recovered by recruitment.***"
>
> "***(A)ny collision mortality of spectacled or Steller's eiders would be considered a major impact if these bird losses were not recovered within a generation***."
>
> "***Spectacled eiders would be the most impacted of the listed species, with direct effects to nesting habitats as well as likely direct mortality from vessel encounters….The potential level of mortality to these species, combined with habitat loss and longterm disturbances from pipeline corridor maintenance for the entire Scenario are anticipated to result in a major impact on threatened and endangered marine and coastal birds, especially the spectacled eider.***"

Walrus

> "Some researchers believe that ***the (walrus) population may be in decline*** based on age structure and productivity information (GarlichMiller, Quakenbush and Bromaghin, 2006) ***due to changes in sea ice and prey availability*** (Taylor and Udevitz, 2014). ***The Pacific walrus is listed as a candidate for threatened status under the Endangered Species Act due to the continuing loss of sea ice habitat caused by climate change*** (76 FR 7634 [Feb

10, 2011]). ***With a population in decline, any loss of large numbers of walruses, walrus habitat, or prey species would exacerbate that decline. Recovery would not occur unless the population begins to rebound from other factors that may be limiting population productivity or growth, such as decreasing sea ice extent, prey availability or harvest.***"

"***Walrus could be directly and indirectly affected by an offshore oil spill. Exposure to oil or associated fumes could cause respiratory distress and inflammation of mucous membranes and eyes, leading to damage such as abrasions and ulcerations. Walrus, which have large protruding eyes, would be particularly vulnerable.*** Walrus rely primarily on a thick layer of blubber for insulation and therefore are less likely than fur bearers to suffer from hypothermia as a result of oiling. However, ***they may be more likely to suffer skin inflammation and ulcers as a result of oil exposure.*** Studies have shown that while marine mammals such as walrus are not usually killed by surface contact with oil, ***ingestion of oil or oil contaminated prey items can cause tissue changes (Kooyman, Gentry and McAlister, 1976)….Chronic exposure may still result in lethal effects or long term sub-lethal effects that reduce fitness."***

"***If pack ice is located within 10-20 mi (16-32 km) of the drilling unit, walrus would likely be affected***."

"During ice-breaking activities, ***walrus moved 12.4 to 15.5 mi (20 to 25 km) from the operations*** where sound energy levels were 11%-19% above ambient sound level. Thus, walrus were simply displaced away from vessels to areas where sound levels approached ambient levels." **NOTE: BOEM minimizes the effects here and contradicts related conclusions, particularly energetic and competitive costs from such displacement, such as the conclusion below:**

"Walrus primarily feed on benthic invertebrates, such as clams and marine worms. Benthic invertebrates that come into contact with the spill would ingest hydrocarbons from water, sediments and food. ***Invertebrates could concentrate contaminants because they metabolize hydrocarbons poorly. Long-term or chronic oil ingestion may result in kidney damage, liver damage, or ulcers in the digestive tracts of walrus.*** Depending upon the level of impacts to benthic invertebrates, ***walrus could be forced to travel farther to forage, resulting in increased energetic costs and perhaps increased competition among walrus for food sources.***"

"Depending upon the location of the spill site and other factors, ***oil could contact shore within 10 days of the initial event. Walrus could come into contact with oil at coastal haulouts. Regardless of whether contact occurred at sea, on ice or on land, the results to the physical health of the walrus would be the same as those listed under Phase 2. If walrus avoid coastal areas that have been fouled by oil, they may be excluded from important coastal resting areas once the sea ice retreats off of the continental shelf in late summer. Walrus cannot remain at sea indefinitely; they must haul out to rest***…"

"Calves and young walrus are more restricted in the amount of time that they can spend at sea, and are unable to swim as far or for as long as adult walrus. ***This worst-case scenario could lead to population-level effects***."

"***At that time of year, the females are calving and the calves may be especially sensitive to the effects of oil or disturbance. High rates of spontaneous abortions have been reported*** for some other marine mammal species after a spill…"

"***Walrus may continue to be exposed to hydrocarbons through their prey, which may lead to reduced fitness and possibly population-level effects over time.***"

"***Significant impacts to the walrus population would be most likely to occur if large scale contamination of prey and habitat persisted for years; or if a VLOS contacted a large concentration of walrus at a foraging area*** such as the HSWUA or while the population is concentrated on sea ice or terrestrial haulouts."

"***During early spring and summer months, nearly the entire population of Pacific walrus can be found in the Chukchi Sea, and they could be extremely vulnerable to a large oil spill at this time.*** Areas where walrus are largely concentrated at some times of the year and therefore more vulnerable include the HSWUA, terrestrial haul out areas near Pt. Lay and the Russian coastline (USFWS, 2013; Jay et al., 2012)."
"***At the highest level of activity in the scenario and without appropriate mitigation, population level impacts to walrus could occur.***"

"***Additional benthic habitat would be disturbed by an estimated 190-210 miles of offshore oil and gas pipelines. This loss of foraging habitat over a period of approximately 25 years could potentially result in population level effects to walrus*** unless project-specific mitigation measures are carefully applied."

"***The greater use of the coastline by large aggregations of walrus puts them at increased risk from oil spills and disturbance events onshore***…"

Very simply, even according to BOEM's own review, Federal Lease Sale 193 should legally never have been allowed to proceed. This sale and subsequent impacts would harm, threaten, and further endanger or even decimate Federally listed and candidate Endangered and/or Threatened species and their critical habitats. Federal Lease Sale 193 violates the law and the United States Endangered Species Act, the United States National Environmental Policy Act, and the United States Clean Air Act. FLS 193 also breaches regulations set and enforced by the United States Environmental Protection Agency, the United States Fish and Wildlife Service, the United States National Oceanic and Atmospheric Administration, and the United States National Marine Fisheries Service. Furthermore, FLS 193 contravenes recommendations by the United Nations Intergovernmental Panel on Climate Change and guidelines and regulations of the Executive Office of the President of the United States as advised by the United States Council on Environmental Quality.

Therefore, Federal Lease Sale 193 is highly negligent, contravenes Congressional Acts and Federal regulations, is illegal, and is a gross abuse of discretion and authority. It is incumbent upon the United States Federal government to vacate FLS 193 immediately in its entirety or select Alternative II – No Lease Sale.

8) On 3 December 2014, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) announced a critical habitat designation for Arctic subspecies (Phoca hispida hispida) of the ringed seal (Phoca hispida) under the Endangered Species Act (ESA) covering 350,000 square miles in the northern Bering, Beaufort, and Chukchi Seas, encompassing Federal Lease Sale 193. In addition, in December 2012, NMFS listed four subspecies of the ringed seal along as Threatened or Endangered under the ESA (77 FR 76740). The proposed critical habitat rule notes that the ringed seal along with other seals (Beringia DPS of the bearded seal) and species and their critical habitats could be adversely affected by numerous oil and gas activities, including seismic surveys, drilling operations, production, development, and potential oil spills, among others. NOAA stated that oil and gas activities must specifically consider the seals' habitat as well as that for other Federally listed species, including whales, Pacific walrus, and polar bears. Proceeding with FLS 193 would endanger ringed seals, polar bears, whales, walrus, and other species and would contravene the Endangered Species Act, NOAA, NMFS, and the USFWS.

The following comments are provided by both Greenpeace and the Center for Biological Diversity, which has over 320,000 members and online advocates and is dedicated to the protection of native species and their habitats through science, policy, and environmental law. Portions of these comments were first published in the Federal Register via www.regulations.gov on 25 March 2011 ("Re: Comments on the Proposed Threatened Status for Subspecies of the Ringed Seal (75 Fed. Reg. 77476); and Proposed Threatened and Not Warranted Status for Subspecies and Distinct Population Segments of the Bearded Seal (75 Fed. Reg. 77496)") and are revised and updated herein by Greenpeace relative to Federal Lease Sale 193 and the current NMFS December 2014 critical habitat listing for ringed seals.

On 28 December 2012, the National Marine Fisheries Service (NMFS) published a final rule to list the Arctic subspecies (*Phoca hispida hispida*) of the ringed seal (*Phoca hispida*) as Threatened under the Endangered Species Act (ESA) (77 FR 76706). Section 4(b)(6)(C) of the ESA also requires the Secretary of Commerce to designate critical habitat. Both Greenpeace and the Center for Biological Diversity (we) strongly support the NMFS proposal to list critical habitat for the Arctic ringed seal due to climate change threats. Although we support NMFS's determination that the foreseeable future for assessing impacts from climate change for the Arctic ringed seal is the end of the 21st century and that the proposed rules state that the IPCC data and analyses "currently form the most widely accepted version of the best available data about future conditions", we strongly encourage NMFS to consider the most recent analyses by the IPCC

(2014) stating that, at current emissions rates, the global carbon budget will be depleted within 30 years of 2011.

As we discussed in our former ESA listing Petition and prior comment letters for these species, IPCC climate change projections represent the internationally accepted best-available science on future climate conditions. The sea-ice analyses for the Okhotsk and Bering Seas in the proposed rules are improved and more transparent than those presented in 12-month findings for the ribbon and spotted seals. In addition, we commend NMFS on its snow depth analysis for the ringed seal, which has advanced scientific understanding of changes in snow depth in the Arctic and its implications for Arctic species like the ringed seal.

In our comments below, we demonstrate that BOEM's assumptions and conclusions do not provide for a reasoned choice of alternatives, are negligent, arbitrary, capricious, an abuse of Federal agency discretion, and an unlawful violation of NEPA. BOEM must postpone or cancel FLS 193 because it would violate the ESA and harm Federally listed and candidate Endangered and Threatened species, including *via* critical habitat destruction. Federal Lease Sale 193 and any other Federal, state, or private action that could jeopardize such species in any way, including via habitat destruction, must be suspended, deferred, or cancelled until the responsible Federal agencies (NOAA, NMFS, USFWS, EPA) are fully consulted and informed of all direct, indirect, and cumulative impacts in the Final EIS, are able to advise and make a fully informed and reasoned choice of alternatives, and can finalize the necessary legal designations.

We further (1) retransmit new scientific studies on climate change and ocean acidification that support the proposed listings and critical habitat designation for the ringed seal; (2) discuss concerns about oversights in the proposed rules, including the failure to determine that ocean acidification along with oil and gas development threaten the continued existence of ringed and bearded seals; and (3) provide information to inform critical habitat designation for ringed and bearded seals within U.S. waters.

I. Suspension Of All Federal Actions That Would Harm Federally Listed And Candidate Species And/Or Their Critical Habitats

Pursuant to the United States Endangered Species Act (ESA), BOEM must suspend or cancel FLS 193 because it would violate the ESA by a) not "further(ing) the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species" and

b) "jeopardize(ing) the continued existence of endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary…to be critical", and c) directly harming several Federally listed and candidate Endangered and Threatened species, including *via* habitat destruction – in particular for the polar bear (*Ursus maritimus*), Pacific Walrus (*Odobenus rosmarus divergens*), Arctic ringed seal (*Phoca hispida*), Stellar's eider (*Polysticta stelleri*), spectacled eider (*Somateria fischeri*), and three whale species (bowhead (*Balaena mysticetus*), fin (*Balaenoptera physalus*), and humpback (*Megaptera novaeangliae*)). Although the Beringia bearded seal DPS (*Erignathus barbatus*) was officially listed as Threatened, a July 2014 court ruled that listing should be vacated until the designation is remedied. At the current time the population remains listed under the Endangered Species Act as well as by NOAA/NMFS (2014).

According to the ESA (emphasis added):

> "SEC. 7. (a) FEDERAL AGENCY ACTIONS AND CONSULTATIONS — (1) The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. ***All other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act.***
>
> ***(2) Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical,*** unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. ***In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.***
>
> (3) Subject to such guidelines as the Secretary may establish, ***a Federal agency shall consult with the Secretary on any prospective agency action at the request of, and in cooperation with, the prospective permit or license applicant if the applicant has reason to believe that an endangered species or a threatened species may be present in the area affected by his project and that implementation of such action will likely affect such species***.
>
> ***(4) Each Federal agency shall confer with the Secretary on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under section 4 or result in the destruction or adverse modification of critical habitat proposed to be designated for such species.*** This paragraph does not require a limitation on the commitment of resources as described in subsection (d)."

Federal Lease Sale 193 and any other federal, state, or private action that could jeopardize such species in any way, including *via* habitat destruction, must be suspended, deferred, or cancelled until the responsible Federal agencies (NOAA, NMFS, USFWS, EPA) are fully consulted and informed through the "*best scientific and commercial data available"* of all direct, indirect, and cumulative impacts in the EIS of such Federal actions, are able to advise and make a fully informed and reasoned choice of alternatives, and can finalize the necessary legal designations for those endangered/threatened species. In particular, NOAA and NMFS have proposed critical habitat designation for the Arctic ringed seal in the Chukchi, Beaufort and Bering Seas that would encompass FLS 193. Pursuant to U.S. law and Congressional Act, the ESA supersedes all other Federal, State, and private land and sea natural resource management actions. NOAA and NMFS must be granted full authority to proceed with the proposed Endangered/Threatened species critical habitat designation without interference by any other Federal agency or action and without those agencies or actions negatively affecting either the Federally listed and candidate Endangered/Threatened species or their proposed critical habitats. Therefore, pursuant to the United States Endangered Species Act, the Federal government must suspend or vacate FLS 193 or choose Alternative II – No Lease Sale.

II. New Scientific Studies Support the Proposed Rules of the Ringed and Bearded Seal Due to Climate Change Threats

A. New Studies Indicate That The Risks From Climate Change And Ocean Acidification Are Substantially Greater Than Previously Assessed

Several prominent studies and reports, particularly by the IPCC (2013, 2014) have concluded that key risks from anthropogenic climate change and ocean acidification are substantially greater than previously assessed, as indicated by observations of climate change impacts and improved modeling studies (Fussel 2009, Smith et al. 2009). These studies, including the IPCC Fifth Reports (2013, 2014) raise cause for concern that previous climate change projections used in the NMFS Status Reviews as well as assessments by other agencies likely underestimated climate change risks to ringed and bearded seals along with dependent species, such as polar bears. Specifically, recent studies demonstrate that climatic indices are changing more quickly than projected by earlier reports; climate impacts are occurring at lower surface temperatures than previously estimated; temperature change and sea level rise during this century

will be greater than previously projected; and the climate is approaching "tipping points" beyond which the climate system is expected to switch to a different state (IPCC 2014, IPCC 2013, Lenton et al. 2008, Fussel 2009, McMullen and Jabbour 2009, Richardson et al. 2009). As summarized by the IPCC noted earlier in these comments and by Fussel (2009) here:

> "[M]any risks are now assessed as stronger than in the AR4, including the risk of large sea level rise already in the current century, the amplification of global warming due the biological and geological carbon-cycle feedbacks, a large magnitude of "committed warming" currently concealed by a strong aerosol mask, substantial increases in climate variability and extreme weather events, and the risks to marine ecosystems from climate change and ocean acidification."

In reviewing the projected impacts from continuing climate change, Anderson and Bows (2010) concluded that the impacts associated with a 2°C temperature rise have been "revised upwards, sufficiently so that 2°C now more appropriately represents the threshold between 'dangerous' and 'extremely dangerous' climate change". Similarly, Kiehl (2011) concluded that the Earth's sensitivity to CO_2 radiative forcing may be much greater than the sensitivity assumed in previous climate models, meaning that the Earth may warm faster than climate models have projected due to slow feedback processes that have not been accounted for. Based on paleoclimatic evidence from Earth's past, this study found that the Earth's CO_2 concentration is rapidly rising to a level not seen in approximately 30 - 100 million years when the Earth was much warmer and that, at these higher CO_2 concentrations, positive feedback processes would likely amplify global warming beyond current modeling estimates. This study estimated that the climate sensitivity or "climate feedback factor" for a doubling of CO_2 from the present-day climate state might be more than double than prior estimates. The climate sensitivity appears to be 2°C/W/m^2 in periods of past warming whereas climate models use a climate sensitivity of ~0.5 to 1°C/W/m^2. This study also suggests that the risks from climate change are much greater than assessed in the IPCC AR4 (i.e. IPCC 2007).

In addition, new analyses warn that the probability of reaching extremely dangerous temperature increases of 3ºC or 4ºC within this century is much greater, given the failure of governments to implement effective mitigation policies. New et al. (2010) and Anderson and Bows (2010) concluded that the continued rise in GHG emissions in the past decade and the delays in a comprehensive global emissions reduction agreement make limiting temperature rise

below 2ºC "extremely difficult, arguably impossible, raising the likelihood of global temperature rises of 3ºC or 4ºC within this century" (New et al. 2011:6).

B. Arctic Summer And Winter Sea-Ice Continue To Decline; Arctic Summer Sea-Ice Is Likely To Disappear Almost Entirely In The 2030s

Arctic sea-ice extent and thickness has continued its precipitous decline, and Arctic summer sea ice has not recovered from the record low reached in September 2007. The minimum sea-ice extent for September 2010 was third lowest in the satellite record, behind 2007 (lowest) and 2008 (second lowest), despite the late date of the maximum winter sea-ice extent in 2010 (NSIDC 2010). The linear rate of decline of September ice extent over the period 1979 - 2010 is now 81,400 square kilometers (31,400 square miles) per year, or 11.5% per decade relative to the 1979 - 2000 average. According to the National Snow and Ice Data Center, 2010 began in a highly negative phase of the Arctic Oscillation, which typically favors the survival of old ice through the winter and more ice at the end of the summer (NSIDC 2010). However, much of the old ice that was transported into the southern Beaufort and Chukchi Seas melted in the summer months. In fact, current models suggest an ice-free summer by mid-century (IPCC 2013, 2014) and as early as the late 2030s (Zang 2010), which is also the project depletion of the global carbon budget (IPCC 2013). Sea ice was much thinner at the end of the summer of 2010; less than 15% of the ice remaining in the Arctic was more than two years old, compared to 50-60% during the 1980s, and virtually none of the oldest ice remained in the Arctic (NSIDC 2010).

Winter sea ice also continues to decline significantly. The winter sea-ice maximum in March 2011 tied with March 2006 as the lowest in the satellite record. At 4.64 million km^2 (5.65 million mi^2), the sea-ice maximum on 7 March 2011 was 471,000 mi^2 (1.2 million km2) below the 1979 - 2000 average — an 8% decline (NSIDC 2011a). The sea-ice extent in March 2011 (Figure 2) was reduced to a level that the IPCC mean model ensemble did not project would occur until 2070 (Stroeve et al. 2007). Arctic sea ice in December, January and February also reached record lows as winter temperatures across much of the Arctic were anomalously warm, reaching 2 - 6ºC (4 - 11ºF) above normal in January (NSIDC 2011b, c).

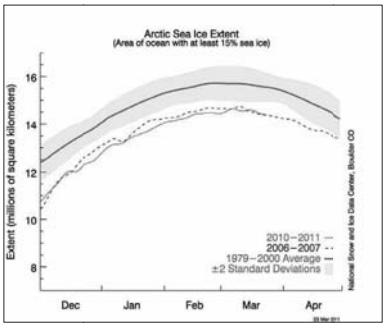

Figure 2. Arctic sea-ice maximum in March 2011 reaches a historic low (Stroeve et al. 2007).

A recent study by Zhang (2010) improved the sea ice projections of the IPCC AR4 models, which considerably underestimate the recent accelerating sea-ice reduction. Zhang (2010) evaluated the sensitivities of summer sea-ice coverage to global warming-forcing in models and observations. Zhang (2010) observationally constrained the selected model runs by the sensitivity analysis and the models better captured the observed changes in sea-ice area and surface air temperatures, reducing future projection uncertainties. Using these improved model runs, Zhang (2010) projected that an ice-free summer Arctic Ocean may occur as early as in the late 2030s using a criterion of 80% sea-ice area loss. In addition, the Arctic regional mean surface air temperature will likely increase by 8.5 ± 2.5ºC in winter and 3.7 ± 0.9ºC in summer by the end of this century. The projection by Zhang (2010) that Arctic summer sea ice will virtually disappear as early as the 2030s is consistent with prior estimates by Stroeve et al. (2008), Wang and Overland (2009), and Lindsay et al. (2009) as well as with the IPCC (2013) projections that the global carbon budget will be depleted by the mid 2030s.

C. Ocean Acidification Poses A Threat To The Ringed And Bearded Seal

New scientific studies continue to confirm that ocean acidification in the Arctic poses an imminent, high-magnitude threat to ringed and bearded seals along with numerous other species, including other Federally listed species under the Endangered Species Act. Azetsu-Scott et al. (2010) measured the saturation state with respect to calcite and aragonite for waters in the Canadian Arctic Archipelago—including Smith Sound, Barrow Strait, Baffin Bay, Davis Strait, Hudson Strait, and the Labrador Sea—and found the saturation states to be extremely low. The average aragonite saturation state (Ω aragonite) was 1.18 ± 0.17 in Barrow Strait and 1.31 ± 0.14 in Smith Sound, with areas where Ω aragonite < 1. The aragonite saturation horizon was found at ~150 m in Barrow Strait; at 200 m in Baffin Bay, Davis Strait, and Hudson Strait; and at 2,300 m in the Labrador Sea. The study found that "[t]his level of saturation state is a great concern for organisms such as Arctic pelagic mollusk, which is an important component of marine food webs in high-latitude oceans." As discussed in our May 2010 letter, seasonal aragonite undersaturation in other regions of the ringed and bearded seal range, including the Bering Sea, Chukchi Sea, and Canada Basin, is already occurring (Bates et al. 2009, Fabry et al. 2009, Yamamoto-Kawai et al. 2009).

D. Regulatory Mechanisms To Address Climate Change And Ocean Acidification Are Ineffective

As acknowledged by the proposed NOAA Fisheries rules, "there are currently no effective mechanisms to regulate GHG emissions, which are contributing to global climate change and associated modifications to [ringed and bearded] seal habitat. The risk posed to [ringed and bearded] seals due to the lack of mechanisms to regulate GHG emissions is directly correlated to the risk posed by the effects of these emissions" (75 Fed. Reg. 77508). As described below, the continued failure of the U.S. government and international community to implement effective and comprehensive greenhouse gas reduction measures places ringed and bearded seals at ever-increasing risk, where the worst-case IPCC scenarios are becoming more likely.

U.S. regulatory mechanisms are inadequate to effectively address climate change. While existing laws, including the Clean Air Act, Energy Policy and Conservation Act, Clean Water Act, Endangered Species Act, and others provide authority to Executive Branch agencies to require greenhouse gas emissions reductions from virtually all major sources in the U.S., these agencies

are either failing to implement or only partially implementing these laws for greenhouse gases. For example, the EPA recently issued a rulemaking regulating greenhouse gas emissions from automobiles (75 Fed. Reg. 25324, Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule), but has failed to implement the majority of other Clean Air Act programs, such as the new source review, the new source pollution standards, or the criteria air pollutant/national ambient air quality standards programs, to address the climate crisis (See, e.g. 75 Fed. Reg. 17004, Reconsideration of Interpretation of Regulations That Determine Pollutants Covered by Clean Air Act Permitting Programs). While full implementation of these flagship environmental laws, particularly the Clean Air Act, would provide an effective and comprehensive greenhouse gas reduction strategy, due to their non-implementation the existing regulatory mechanisms must be considered inadequate to protect the ringed and bearded seals, polar bears, walrus, and other species from climate change. Additional mean emissions of 10.128348 $GtCO_2$-equivalent from the end use of FLS 193 would be a significant and excessive contribution (IPCC 2013, 2014) to ringed and bearded seal habitat destruction.

Despite the White House's 2014 pledge with China to reduce emissions along with all other current international initiatives, the additional mean emissions of 10.128348 $GtCO_2$-equivalent to the atmosphere from the end use of FLS 193 would relegate these agreements inadequate to effectively address climate change. The Kyoto Protocol's first commitment period only set targets for action through 2012, and there is still no binding international agreement governing greenhouse gas emissions in the years beyond 2012. While the 2009 U.N. Climate Change Conference in Copenhagen called on countries to hold the increase in global temperature below 2□C (an inadequate target for avoiding dangerous climate change), the non-binding "Copenhagen Accord" that emerged from the conference failed to enact binding regulations that limit emissions to reach this goal. Even if countries did meet their pledges, analyses of the Accord found that collective national pledges to cut GHG emissions are inadequate to achieve the 2°C target, and instead suggest emission scenarios leading to 2.5 - 5□C warming (Rogelj et al. 2010, UNEP 2010).

III. Concerns With The Proposed Rules

A. NMFS Should Re-Evaluate Whether The 25% And 15% Sea-Ice Concentration Thresholds For The Bearded Seal Are Protective Enough

According to the Draft SSEIS (BOEM 2014a), bearded seals (*ugruk*) are identified as the most harvested resource in the proposed FLS 193 area, providing meat and oil for consumption and are an important prey species for polar bears, Orca, and walrus. The availability of sea ice is a major habitat requirement for bearded seals (Kovacs and Lowry 2008). According to the IUCN Species Survival Commission Pinniped Specialist Group (Kovacs and Lowry 2008) (emphasis added):

> "***The availability of sea ice is a major habitat determinant for bearded seals***. They are typically found in regions of broken free-floating pack ice; in these areas bearded seals prefer to use small and medium sized floes, avoiding large floes (Simpkins *et al*. 2003). They rarely haul out more than a body length from water and they use leads within shore-fast ice only if suitable pack ice is not available (Kovacs 2002). ***Bearded Seals naturally occur at quite low densities*** (*e.g.*, Bengtson *et al*. 2005); they are typically solitary animals, but will form small, loose aggregations when ice availability is limited, such as at the time of moulting in midsummer."
>
> "***Global climate warming is currently causing major reductions in the extent and duration of sea ice cover in the Arctic, creating a threat to many species of marine ice-associated mammals***. ***Pinnipeds, such as the Bearded Seal that are dependent on sea ice for pupping, moulting, resting and access to foraging areas, may be especially vulnerable to such changes*** (Tynan and DeMaster 1997, Learmonth *et al*. 2006, Kovacs and Lydersen 2008, Laidre *et al*. 2008)."
>
> "***Oil spills from offshore extraction and transportation could negatively affect bearded seals through direct contact with oil and damage to foraging areas and stocks of prey, particularly benthic invertebrates, which are vulnerable to oil contamination*** (Kelly 1988)"
>
> "***An increase in human-created noise in the arctic environment could cause marine mammals, including Bearded Seals which are very vocal during their breeding season*** (VanParijs *et al*. 2001, 2003), ***to abandon areas of habitat*** (Tynan and DeMaster 1997). ***A reduction in sea ice cover would likely lead to increased human activity in the Arctic in the form of shipping and extractive industries, and an associated greater threat of marine accidents and disturbance of marine mammals*** (Pagnan 2000)."

When determining sea-ice requirements for the bearded seal, the NMFS biological review team (BRT) assumed that areas with sea-ice coverage in April and May below 25% concentration were inadequate for whelping and nursing. The BRT also assumed that ice coverage <15% in June would be insufficient for moulting. Although we appreciate that the BRT had limited information to estimate habitat suitability for bearded seals, we are concerned that these thresholds may not be protective enough. Three studies, only two of which were cited by the BRT, found that bearded seal probability of occurrence increased in areas of higher ice coverage: Simpkins et al. (2003), Ver Hoef et al. (in review), and Kingsley et al. (1985) which was not cited. Kingsley et al. (1985) found that bearded seals in the Canadian High Arctic prefer broken ice, particularly in large floes with ice cover of 6/8 - 7/8, also indicating that medium-high ice coverage provides the best habitat for seals. Although there is likely a sea-ice concentration below which bearded seals cannot use the sea ice, there is also likely a non-linear relationship between sea-ice concentration and probability of occurrence, where the probability of occurrence is maximized at medium-high coverage (~70 - 90%) and declines at higher and lower sea-ice concentrations. The sea-ice concentration thresholds used by the BRT for whelping, nursing, and moulting do not take into account the lower probability of occurrence of bearded seals at medium-low ice concentrations and, thus, may over-estimate the bearded seal's ability to use this marginal sea-ice habitat.

The preponderance of scientific data and analyses clearly indicate that Arctic sea ice is declining significantly due to climate change. Consequences of FLS 193 oil and gas exploration, production, and development will contribute to climate change and the impacts are significantly greater than BOEM has acknowledged. The additional effects as a consequence of FLS 193 will significantly impact ringed seal, bearded seal, polar bear, walrus, whale and other Endangered/Threatened species' critical habitat in direct contravention of the Endangered Species Act and the NMFS proposed critical habitat designation. Therefore, FLS 193 must be vacated or Alternative II – No Lease Sale – should be selected.

B. Ocean Acidification Should Be Determined To Be A Threat To The Ringed And Bearded Seals

Numerous scientific studies indicate that ringed and bearded seals are threatened by ocean acidification, especially when considered cumulatively on their habitat and with other climate change impacts. According to BOEM (2014a):

> "(O)cean acidification and climate change would result in changing baseline conditions that would impact benthic, pelagic, and epontic lower trophic populations."

The scientific evidence is as follows, much of which is acknowledged by the proposed rules and Status Reviews: (1) ocean acidification is a predictable consequence of rising atmospheric CO_2; (2) the waters of the Arctic and adjacent seas are among the most vulnerable to ocean acidification; (3) seasonal aragonite undersaturation is already documented in many Arctic regions; (4) prey items for ringed and bearded seals, including bivalves, fish, and squid are negatively impacted by ocean acidification in laboratory experiments at acidification levels expected in this century; (5) by 2050, all Arctic waters will be undersaturated with respect to aragonite; and (6) ocean acidification is irreversible for tens of thousands of years after emissions cease. Clearly the dramatic changes in pH and aragonite undersaturation threaten these seals' food supply. Ocean acidification also exacerbates the impacts of ocean noise pollution, which was not analyzed in any of the findings, including BOEM's Draft SSEIS (2014a).

In sum, FLS 193 cannot proceed until NMFS re-evaluates its determination that ocean acidification, seismic activity, and noise associated with seismic and other oil and gas exploration, development and production activities do not threaten these seals, particularly when considered cumulatively with other threats.

C. Declines In Benthic Biodiversity Due To Ocean Warming Should Be Determined To Be A Threat To The Ringed Seal and The Beringia DPS Of The Bearded Seal

According to the IUCN Species Survival Commission Pinniped Specialist Group (Kovacs and Lowry 2008):

> "Bearded Seals feed primarily on or near the bottom and most diving is to depths of less than 100 m…They use their elaborate whiskers to search for prey on and in soft bottom substrates (Marshall *et al*. 2007, 2008). Because of their benthic feeding habits they live primarily in waters overlying the continental shelf..."
>
> "Their (bearded seals) primary foods live on or near the bottom, but also include some infauna as well as schooling and demersal fish (Burns 1981, Hjelset *et al*. 1999). In the Kara and Barents seas, the diet is dominated by crustaceans (shrimps) and molluscs (gastropods and bivalves). Cod, other demersal fish, and worms are also regular components of the diet. A wide variety of prey has been reported from the Sea of Okhotsk with crabs and shrimps accounting for 87% of the total intake for animals in the north, and clams, worms, and gastropods making up 40%, 23%, and 12% respectively of the intake for animals in the south near Sakhalin Island. In the Bering and Chukchi Seas, snow crab

> was the most important prey, followed by the crab *Hyas coarctatus*, while the reverse was true farther north. Shrimp species, gastropods, and octopus are important in both the northern and southern Bering Sea and the Chukchi Sea. The diet is similar in the Beaufort Sea with the addition of Arctic cod (*Boreogadus saida*) (Burns 1981)."

The bearded seal proposed rule found that changes in prey due to ocean warming do not pose a threat to this species, despite the scientific evidence indicating that benthic biomass in the northern Bering Sea and Chukchi Sea food webs is declining and that, as noted above, ocean acidification is impacting the benthic and pelagic food chain upon which the seals depend. In addition, ocean acidification is being exacerbated by climate change and oil and gas activities resulting from FLS 193 will add to and significantly compound these effects.

The best-available science indicates that reductions in sea-ice extent are resulting in a shift in the northern Bering Sea from a benthic-dominated ecosystem rich in bottom-dwelling prey for the bearded seal to one dominated by pelagic processes (Grebmeier et al. 2006a, Grebmeier et al. 2006b, Grebmeier 2010). While predicting detailed biological responses can be challenging, scientific studies to date provide sufficient guidance indicating that benthic food sources on the Beringia shallow shelf are declining and threaten these seals. Even according to BOEM in its Draft SSEIS (BOEM 2014a), oil and gas exploration, production and development activities resulting from FLS 193 would have "long-lasting and wide-spread effects" on the benthic community. Such effects directly and indirectly impact both ringed and bearded seals as well as other Endangered and Threatened species, such as walrus and polar bears (BOEM 2014a) and are, in fact, significant.

> "After cleanup efforts have ceased, the remaining oil would continue to weather and be subject to microbial degradation. This process is likely to be very slow in Arctic waters. Oil that has been suspended in the water column or in the sediment may continue to be ingested by the benthic organisms…"
>
> "The discharge of drill cuttings, drilling fluids, and well cellar sediment that is calculated to be discharged into the water during various drilling activities (see Table 4-7) could impact the availability of benthic prey…especially if the wells are located in prime…foraging areas."
>
> "Each disturbed site would take approximately 1-5 years for benthic invertebrates to recolonize the site (see lower trophic levels Section 4.3.4). It would take an additional 2-3 years for benthic invertebrates such as clams and other mollusks to attain an optimum size as…prey. Each disturbed site would likely be unavailable…for foraging for approximately 3-8 years."

BOEM (2014a) suggests that the impacts are "negligible" or "minor" on the benthic community and does not adequately address subsequent impacts on ringed and bearded seals as well as numerous other Federally listed and candidate Threatened and Endangered species. As such, BOEM's assumptions and conclusions do not provide for a reasoned choice of alternatives, are negligent, arbitrary, capricious, an abuse of federal agency discretion, and an unlawful violation of NEPA. BOEM must postpone or cancel any federal action that would violate the ESA and threaten Federally listed species, including via habitat destruction:

> "Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes…" [National Environmental Policy Act, 42 U.S.C. 4331]

In this instance, NMFS has proposed critical habitat designation for species protected under the Endangered Species Act. This critical habitat protection would effectively prohibit oil and gas exploration, production, and development in the Chukchi, Beaufort and Bering Seas. Quite simply, proceeding with FLS 193 will cause direct and indirect harm and endangerment of, and contravene the Endangered Species Act requirements for, ringed seals, bearded seals, polar bears, whales, walrus, and numerous other species and their critical habitats. Therefore, FLS 193 must be vacated or Alternative II – No Lease Sale – must be selected.

D. Offshore Oil And Gas Development Should Be Determined To Be A Threat To Ringed And Bearded Seals

Offshore oil and gas development poses a significant threat to ringed seals and myriad other species by increasing the risk of oil spills and noise pollution (NRC 2014) in important breeding and foraging grounds and other critical habitats. Such impacts have been acknowledged by NMFS (2014) as well as BOEM in its Draft SSEIS (BOEM 2014a). The proposed ESA critical habitat rules acknowledge that offshore oil development is currently underway within the range of ringed and bearded seals in the United States, Canada, Greenland, Norway, and Russia, that "oil spills under ice or in ice-covered waters….cannot be contained or recovered effectively in current

technology," and that "tanker spills, pipeline leaks, and oil blowouts are likely to occur in the future, even under the most stringent regulatory and safety systems. (75 Fed. Reg. 77487, 77509)." Shell's unprecedented proposal seeks to expand drilling and oil and gas production in critical habitat for the ringed and bearded seals in the Chukchi Sea. After the tragedy of the Deepwater Horizon disaster and the National Oil Spill Commission's cautionary recommendations regarding offshore drilling in the Arctic, Shell's decision to pursue such an aggressive drilling proposal in the range of Federally listed ringed and bearded seals is cause for serious concern. As NMFS notes in its Federal listing on 3 December 2014 (emphasis added):

> "***A wide variety of activities may affect the proposed critical habitat for Arctic ringed seals and, if carried out, funded, or authorized by a Federal agency, would require ESA section 7 consultation.*** Such activities or actions include: In-water and coastal construction; activities that generate water pollution; dredging; commercial fisheries; oil and gas exploration, development, and production; oil spill prevention and response; and certain DOD activities."

In addition to impacts from daily activities, including seismic testing, well drilling, over-flights, and transit of ice breakers and other ships, increased oil and gas activity puts local subsistence communities, ringed and bearded seals, polar bears, walrus, eiders, whales, and myriad other species at higher risk of catastrophic impacts from a large oil spill or gas release. There is neither the technology nor the infrastructure to clean or contain an oil spill in treacherous Arctic waters (75 Fed. Reg. 77487) (NMFS 2014). BOEM (2014a) acknowledges these realities as well as the chain of events that would lead to deaths of other Federally listed species (i.e. polar bears) as a result of seal mortalities:

> "Any marine mammals in the vicinity of a large natural gas release could be exposed to toxins and potentially die before the gas could volatize. The species most likely to be affected would be ringed seals and bearded seals…"
>
> "Indirect sources of mortality may occur (to polar bears) when seals or other mammals die from oil exposure."

As the final rules note, an oil spill on the scale of the Deepwater Horizon would have severe and long-lasting effects on impacted wildlife, including ringed and bearded seals (75 Fed. Reg. 77487). Such impacts will act cumulatively with impacts from habitat and prey loss to further

imperil ringed and bearded seals and have been determined to be a threat in the final rule. As such, all activities associated with FLS 193 would imperil ringed and bearded seals and, therefore, would be an unlawful violation of the Endangered Species Act. Thus, FLS 193 must be vacated or Alternative II – No Lease Sale – selected.

IV. Critical Habitat

A. The Importance Of Critical Habitat Under The Endangered Species Act

According to the December 2014 proposed designation by NMFS:

> "The proposed critical habitat area in the northern Bering, Chukchi, and Beaufort seas provides sea ice conditions that are essential for the survival of Arctic ringed seals. The designation of critical habitat areas, land or water under United States jurisdiction that includes habitat features essential to the conservation of a threatened or endangered species, is required for species listed under the ESA."

Critical habitat is defined in Section 3 of the Endangered Species Act ("ESA") as: (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 1533 of this title, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 1533 of this title, upon a determination by the Secretary that such areas are essential for the conservation of the species. 16 U.S.C. §1532(5).

"Conservation" includes not only actions that support the survival of the species, but also its recovery to the point where ESA protections are no longer necessary. 16 U.S.C. § 1532(3). The designation and protection of critical habitat is one of the primary ways in which the fundamental purpose of the ESA "provide(s) a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved". 16 U.S.C. §1531(b).

The legislative history of the ESA shows Congress clearly recognized the importance of critical habitat designation in conserving listed species:

> "[C]lassifying a species as endangered or threatened is only the first step in insuring its survival. Of equal or more importance is the determination of the habitat necessary for that species' continued existence…If the protection of endangered and threatened species

> depends in large measure on the preservation of the species' habitat, then the *ultimate effectiveness of the Endangered Species Act will depend on the designation of critical habitat.* (H.R. Rep. No. 94-887 at 3 (1976))" (emphasis added).
>
> "The primary mechanism by which critical habitat protects a listed species is through the Section 7 consultation process. 16 U.S.C. §1536(a)(2) (1994). Section 7 requires federal agencies to ensure that no action they authorize, fund, or carry out will 'jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical habitat]'."

NMFS (2014) acknowledged several important benefits of critical habitat designation. These include educational benefits:

> "A critical habitat designation contributes to species conservation primarily by identifying critically important areas and by describing the features within those areas that are essential to the species, thus alerting public and private entities to the area's importance. 63 Fed. Reg. 46693, 46696 (September 2, 1998) ('Designated Critical Habitat: Green and Hawksbill Sea Turtles')."

NMFS (2014) also acknowledged in its December 2014 proposed critical habitat designation the Section 7 benefits provided by critical habitat designation:

> "A designation of critical habitat, in addition to emphasizing and alerting public and private entities to the critical importance of said habitat to listed species, provides a clear indication to Federal agencies regarding when section 7 consultation is required, particularly in cases where the action would not result in direct mortality, injury, or harm to individuals of a listed species (e.g., an action occurring within the critical area when a migratory species is not present). The critical habitat designation, describing the essential features of the habitat, also assists Federal action agencies in determining which activities conducted outside the designated area are subject to section 7 (i.e., activities that may affect essential features of the designated area). For example, discharge of sewage or disposal of waste material, or construction activities that could lead to soil erosion and increased sedimentation in waters in, or adjacent essential feature of the designated habitat (water quality) and would be subject to the provisions of section 7 of the ESA."
>
> "A critical habitat designation also assists Federal agencies in planning future actions since the designation establishes, in advance, those habitats that will be given special consideration during Section 7 consultations. With a designation of critical habitat, potential conflicts between projects and endangered or threatened species can be identified and possibly avoided early in the agency's planning process." Id. at 46696-97

According to NMFS (2014) critical habitat also can provide benefits beyond the Section 7 process:

> "Another indirect benefit of a critical habitat designation is that it helps focus Federal, state, and private conservation and management efforts in such areas. Management efforts may address special considerations needed in critical habitat areas, including conservation regulations to restrict private as well as Federal activities. Other Federal, state, and local

> laws or regulations, such as zoning or wetlands protection, may also provide special protection for critical habitat areas." Id. at 46697.

While NMFS has recognized many benefits of critical habitat designation, until recently, NMFS had interpreted the ESA's prohibition against destruction or adverse modification of critical habitat to be largely indistinguishable from the statute's jeopardy prohibition. The Ninth Circuit rejected this merger of the jeopardy and adverse modification inquiries, which previously had the effect of allowing agencies to focus exclusively on whether actions in critical habitat affect a listed species' survival. *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service, 378 F. 3d 1059, 1070 (9th Cir. 2004).* The court concluded that this narrow focus "offends the ESA because the ESA was enacted not merely to forestall the extinction of species (i.e., promote a species survival), but to allow a species to recover to the point where it may be delisted." Id. (citing the ESA's definition of "conservation," 16 U.S.C. § 1532(3)).

In sum, Congress, the courts, and NMFS have repeatedly recognized the significant benefits of critical habitat designation to listed species. Such benefits are not merely theoretical. Studies demonstrate that species with critical habitat protection are twice as likely to recover as those without it (Taylor et al. 2005). It has been clearly demonstrated, acknowledged, and warned that Federal Lease Sale 193 would endanger and very likely destroy critical habitat for the ringed and bearded seals along with polar bears, walrus, spectacled and Steller's eiders, whales, and numerous other species. Therefore, FLS 193 is illegal and contravenes the Endangered Species Act and must be vacated or Alternative II – No Lease Sale – must be selected.

B. Physical And Biological Features Essential To The Conservation Of The Ringed And Bearded Seals

The ESA mandates that specific areas in which are found "physical or biological features essential to the conservation of the species" qualify as critical habitat. 16 U.S.C. §1532(5). According to NMFS' regulations, in designating critical habitat NMFS must consider the requirements of the species, including, but not limited to (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing of offspring; and, generally, (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of the species. 50 CFR 424.12(b).

NMFS's regulations require the agency to list "primary constituent elements" when designating critical habitat. 50 CFR 424.12(b). Primary constituent elements "shall focus on principal biological and physical" elements within the designation area and "may include, but are not limited to, the following: roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, host species or plant pollinator, geological formation, vegetation type, tide, and specific soil types." 50 CFR 424.12(b).

Proposed critical habitat for the ringed and bearded seals must include all principal biological and physical elements for these species, including but not limited to the following: (1) sea-ice types used by the ringed and bearded seals for breeding, feeding, resting, moulting, and other ecological requirements; (2) snow depth during the breeding season, which is an important factor determining the ringed seal's ability to excavate snow caves for resting and breeding purposes; (3) the water column, which represents the three-dimensional foraging habitat for these seals; (4) the benthos, which represents important foraging habitat for the bearded seal; and (5) food resources for these seals.

C. The Principal Physical And Biological Features Require Special Management Considerations And Protection, And Critical Habitat Is Prudent And Determinable

The ESA mandates that designated critical habitat for Endangered or Threatened species must have "physical or biological features which may require special management considerations or protection." 16 U.S.C. §1532(5). The proposed principal biological and physical elements listed above are threatened by climate change, oil and gas development, fisheries, and human disturbance and, thus, require special management considerations and protections. Critical habitat for ringed and bearded seals is both prudent and determinable as required under the ESA. 50 CFR 424.12. Key findings by NOAA under its Federal listing on 3 December 2014 (www.federalregister.gov/articles/2014/12/03/2014-28229/endangered-and-threatened-species-designation-of-critical-habitat-for-the-arctic-ringed-seal#h-20) provide unquestionable support (emphasis added):

> "This proposed rule would designate critical habitat for the Arctic ringed seal pursuant to section 4(b)(2) of the ESA."
>
> "Once critical habitat is designated, section 7(a)(2) of ***the ESA requires Federal agencies to ensure they do not fund, authorize, or carry out any actions that will destroy or adversely modify that habitat***. This requirement is additional to the section 7 requirement

> that Federal agencies ensure their actions do not jeopardize the continued existence of listed species."
>
> "(***T)he protection afforded under the ESA section 7 requirement for Federal agencies to ensure their actions are not likely to destroy or adversely modify designated critical habitat is in addition to ESA requirements to protect listed species***. Specifically, ESA section 7(a)(1) requires all Federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species, and ***section 7(a)(2) requires Federal agencies to ensure their actions are not likely to jeopardize the continued existence of listed species.***"
>
> "In addition, the critical habitat designation may result in indirect benefits, as discussed in detail in the draft economic report (Cardno Entrix, 2014), including education benefits and enhanced public awareness, which may help focus and contribute to conservation efforts for the Arctic ringed seal and its habitat. For example, by identifying features essential to conservation of the Arctic ringed seal and where those features are found, complementary protections may be developed under state or local regulations or voluntary conservation plans. ***These other forms of benefits may be economic in nature (whether market or non-market, consumptive, non-consumptive, or passive), educational, cultural, or sociological, or they may be expressed through beneficial changes in the ecological functioning of the species' habitat, which itself yields ancillary welfare benefits*** (*e.g.*, ***improved quality of life) to the region's human population.*** For example, ***because the critical habitat designation is expected to result in enhanced conservation of the Arctic ringed seal over time, residents of the region who value these seals, such as subsistence users, are expected to experience indirect benefits***. As another example, ***the geographic area of the proposed critical habitat overlaps substantially with the range of the polar bear in the United States, and the Arctic ringed seal is the primary prey species of the polar bear, so the designation may also provide indirect conservation benefits to the polar bear. Indirect conservation benefits may also extend to other co-occurring species, such as the Pacific walrus and other seal species.***"
>
> "***The Secretary…cannot exclude any particular area if, based on the best scientific and commercial data available, the Secretary determines that the failure to designate that area as critical habitat will result in the extinction of the species concerned***. Because the authority to exclude any area from the critical habitat designation is discretionary, exclusion is not required for any particular area…We do not propose to exercise our discretion to exclude any areas from the proposed critical habitat designation."
>
> "***The primary impacts of a critical habitat designation arise from the ESA section 7(a)(2) requirement that Federal agencies ensure their actions are not likely to result in the destruction or adverse modification of critical habitat (i.e., adverse modification standard).*** Determining these impacts is complicated by the fact that section 7(a)(2) contains the overlapping requirement that ***Federal agencies ensure their actions are not likely to jeopardize the species' continued existence (i.e., the jeopardy standard).*** One incremental impact of critical habitat designation is the extent to which Federal agencies modify their proposed actions to ensure they are not likely to adversely modify the critical habitat, beyond any modifications they would make because of listing and the jeopardy standard. Additional impacts of critical habitat designation include any state and/or local protection that may be triggered as a direct result of designation (we did not identify any such impacts), and benefits that may arise from education of the public to the importance of an area for species conservation."

V. Conclusion

In December 2012, NMFS listed four subspecies of the ringed seal along with the Beringia bearded seal DPS as Endangered or Threatened under the ESA (77 *FR* 76740). On 3 December 2014, NMFS publicly announced its proposed critical habitat designation in the Chukchi, Beaufort, and Bering Seas for these species, most particularly for the Arctic Ringed Seal. As a result, all other Federal agencies are required to consult with NOAA Fisheries regarding any actions that would affect these species and their critical habitats (emphasis added):

> "After reviewing the best available information, our scientists identified the habitat features that are essential for sustaining Arctic ringed seals--a species that is likely to become endangered in the foreseeable future due to climate change…. ***Upon designation of a critical habitat area, federal agencies are required to consult with NOAA Fisheries on actions they authorize, fund, or carry out to ensure their actions are not likely to destroy or adversely modify critical habitat.*** Designation of critical habitat would not affect subsistence harvest of ringed seals by Alaska Natives." (NOAA, 2 December 2014).

The best available scientific evidence indicates that the ringed and bearded seals face significant threats from the rapid loss and degradation of sea-ice habitat and snow depth from rising greenhouse gas emissions, ocean acidification, oil and gas development, and other factors. We strongly support the National Marine Fisheries Service proposal listing critical habitat for ringed seals, which will also serve as equal protection for bearded seals, polar bears, walrus and numerous other Arctic species. Proceeding with Federal Lease Sale 193 would significantly contravene laws and Federal protections under the Endangered Species Act as well as numerous regulations imposed and enforced by NOAA, NMFS, and the USFWS, among others, for these species and their habitats.

Proceeding with Federal Lease Sale 193 would be an unlawful Federal action. It is incumbent upon the United States federal government to vacate Federal Lease Sale 193 immediately and in its entirety or select Alternative II – No Lease Sale.

9) BOEM has failed to specifically consider significant new information provided by Greenpeace on 16 August 2012 in its Draft SSEIS analyses as required by NEPA the significant abundances and densities of the cold water soft coral, *Gersemia rubiformis*, in the FLS 193 planning area.

Greenpeace scientists identified high densities of the soft coral *Gersemia rubiformis* in the Chukchi Sea where BOEM proposes exploration drilling should begin.[1] Although a Shell-funded study from 2008 detected these corals at Shell's "Burger" prospect (Blanchard et al. 2010), the Interior Department never considered the presence of the corals in approving Shell's exploration program or the lease sale behind it. The Greenpeace and Blanchard et al. (2010) studies both observed coral abundance that was equal to or greater than most coral rich areas of the world (Miller et al. 2012). This significant new information requires the Department of the Interior under NEPA to supplement its environmental analysis of the impacts of FLS 193 specifically focused on these corals and their significant influence in this Arctic ecosystem.

NEPA requires federal agencies to contemplate the environmental impacts of their actions before committing to a course of action. *Inland Empire Pub. Lands v. United States Forest Serv.*, 88 F.3d 754, 758 (9th Cir. 1996) (finding that NEPA is concerned with the process of disclosure, not any particular result). NEPA "ensures that the agency…will have available, and will carefully consider, detailed information concerning significant environmental impacts; it also guarantees that the relevant information will be made available to the larger [public] audience." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349, 104 L. Ed. 2d 351, 109 S. Ct. 1835 (1989); *Inland Empire*, 88 F.3d at 758. Therefore, NEPA requires Federal agencies to include an environmental impact statement (EIS) "in every recommendation or report on…major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). An EIS *must* be prepared if "substantial questions are raised as to whether a project . . . *may* cause significant degradation of some human environmental factor." *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (9th Cir. 1992) (citation omitted); *Sierra Club v. United States Forest Serv.*, 843 F.2d 1190, 1193 (9th Cir. 1988).

Under NEPA, agencies must not only undertake an EIS prior to taking federal action, but they must also undertake a supplemental EIS whenever: (i) the agency makes substantial changes

[1] *See* Press Release, Abundant Corals Discovered at Shell's Chukchi drill site (July 30, 2012), available at: http://www.greenpeace.org/usa/en/media-center/news-releases/Abundant-corals-discovered-at-Shells-Chukchi-drill-site/.

in the proposed action that are relevant to environmental concerns; or (ii) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. 40 C.F.R. § 1502.9(c)(1).

Here, the initial major Federal action is Lease Sale 193 in the Chukchi Sea, for which Interior produced an EIS in 2007 (MMS 2007) and, pursuant to court order, a supplemental EIS in 2011 (BOEM 2011b) and a Draft Second Supplemental EIS in 2014. None of these documents adequately discuss the impacts on *Gersemia rubiformis* or any other corals in the lease sale area. In 2011 Interior produced an environmental analysis (EA) that tiered to the Lease Sale 193 EIS and SEIS and purported to analyze the environmental impacts of Shell's proposed Chukchi Sea exploration plan (BOEM 2011c). This document also fails to mention or discuss the presence and importance of *Gersemia rubiformis* in the exploration plan area.

The discovery of dense concentrations of *Gersemia rubiformis* in Shell's proposed drilling location qualifies as "significant new circumstances or information" that triggers supplemental NEPA analysis. See, e.g., Native Ecosystems Council v. Tidwell, 599 F.3d 926, 935, 937-38 (9th Cir. 2010) (revelation of nesting habitat in project area, discovered after Forest Service's Environmental Assessment stated that there were no known nesting grounds in area, triggered supplemental NEPA analysis). The public record demonstrates that in a certified and electronic letter dated 16 August 2012, Greenpeace provided this significant new information to U.S. Secretary of the Interior, Ken Salazar, along with the Director of BOEM, Tommy Beaudreau, and the Director of the Federal Bureau of Safety and Environmental Enforcement, James Watson. This letter requested that Interior not issue Shell's final permits to drill until it has analyzed this new information and incorporated it into a supplemental NEPA document. However, BOEM has failed to specifically consider or provide any specific analyses or information concerning this significant scientific information in its 2014 Draft SSEIS. The importance of this coral discovery is discussed in more detail below.

I. Importance of Cold Water Corals

Although there has been little research on corals in the Chukchi Sea specifically, information regarding cold water corals elsewhere in Alaska and the world demonstrates their significance to ocean ecosystems. Cold water corals provide a three-dimensional habitat on the sea floor, which then attracts fish, invertebrates and other species groups to areas of cold water coral, making these coral a critical part of the benthic ecosystem (Krieger 1993, Yoklavich et al. 2000,

Heifetz et al. 2005, Miller et al. 2012). Impacts to the Arctic ecosystem from the destruction and, thus, removal of cold water corals could affect a variety of species, from marine invertebrates and fish to Federally listed Endangered and Threatened seabirds and marine mammals.

Cold water corals comprise important habitat and resources for adult fishes, crustaceans, sea stars, sea anemones, sponges, and other invertebrates. First, cold water corals provide a high relief habitat that serves to protect these species from predators and shelters them from the strong currents that often occur in these areas (Krieger and Wing 2002). The gaps between coral branches or fans provide shelter and refuge for eggs, larvae, and juveniles of shrimp, crabs and fishes, and for many adult species (Krieger and Wing 2002, Reed et al. 2006). The branches of *Gersemia rubiformis* are frequently used as habitat by juvenile basket stars, which are an important part of the benthic community of the Chukchi Sea. Filter feeders use cold water corals as an elevated feeding platform for raising them into the currents above the seafloor where more food is available, and a variety of animals forage in cold water coral areas (Buhl-Mortensen and Mortensen 2005, Krieger and Wing 2002, Parrish et al. 2002). It is clear that fish and invertebrates utilize cold water corals preferentially to other benthic habitats as well as numerous marine mammals and birds, some of which are Federally listed or candidate Endangered or Threatened Species, such as polar bears, walrus, eiders, seals, and various whales. These species groups along with local Iñupiat subsistence communities critically depend on this benthic system directly, on other benthic-dependent species, and in direct food chains (e.g. invertebrates → fish → ringed seals → polar bears/ Iñupiat subsistence hunters) provided only by cold water corals.

Ultimately, the highly significant functional role cold water corals provide for the benthic community is critical to the Arctic ecosystem. As a keystone species, cold water corals play an integral role in maintaining the structure, function, and diversity of an ecosystem. Thus, damage or removal of cold water coral, or habitat loss and degradation, may impact not just the affected coral species, but the entire Arctic ecosystem in which the corals reside (Aydin et al. 2007).

Not only are corals significant to the ecosystem, they are also extremely vulnerable to disturbance and climate change. The preponderance of scientific data, controlled, experimental, and *in situ* studies, and robust analyses are replete with indisputable evidence that physical damage, burial, and increased ocean temperatures and acidification kill corals regardless of their location on the planet. Normal oil and gas exploration activities can adversely impact cold water coral habitats through physical placement of structures, such as anchors, or the discharge of drill cuttings, pipeline construction, and drilling fluids and chemicals (Olsgard and Gray 1995). BOEM

(2014a) along with numerous other studies determined that exposure to drill cuttings and fluids can have a variety of impacts, including alteration of feeding behavior or even death of the coral colony (Rogers 1999), which will impact the entire Arctic food web, including Federally listed and candidate Endangered and Threatened marine mammals, birds, and fish.

Re-colonization and recovery of coral communities where corals have been killed directly, broken, damaged, overturned, or killed from increasing human activity, ocean temperatures, and acidification is on the order of multiple decades to centuries at best, and may not occur at all due to the corals' unique habitat requirements, structural fragility, slow growth rates, reproductive limitations, and extended life histories (Althaus 2009, Hourigan et al. 2009, Williams et al. 2010). Corals may live hundreds to thousands of years (Andrews et al. 2009, Roark et al. 2009). They are not adapted to disturbance and have little genetic variation on which to fall back for re-colonization or recovery of disturbed areas (Hofmann et al. 2010, Miller et al. 2011). Any disturbance created by drilling, exploration, and construction activities will have significant, wide-spread, long-term, if not permanent, and severe impacts on *Gersemia rubiformis*. Consequently, both the direct physical activities from FLS 193 exploration, production and development of oil and gas resources as well as the indirect effects on climate change through the end use of oil and gas produced from FLS 193 will have significant, long-term, wide-spread, and severe impacts on *Gersemia rubiformis* and the northern Alaska Arctic ecosystem.

Given the significance of corals such as *Gersemia rubiformis* to the Chukchi Sea ecosystem, as well as the corals' extreme vulnerability to disturbance and climate change, Interior must specifically address, analyze and provide substantive information regarding the impacts of FLS 193 on these corals before allowing any oil and gas exploration, production, or development to proceed. Not only should no activities in the Chukchi Sea be permitted until Interior has undertaken specific analysis under NEPA, but given that BOEM has been aware of this information for more than two years, but has consistently failed in multiple environmental assessments to specifically address this significant scientific data and provide explicit analyses of the potential impacts on *Gersemia rubiformis* and the surrounding ecological and subsistence communities resulting from FLS 193, such omissions are an abuse of discretion and are arbitrary and capricious. Therefore, BOEM is in direct violation of NEPA and FLS 193 should be vacated or Alternative II – No Lease Sale – should be selected.

Summary Conclusion

Given the substantive issues and supporting information provided in these comments, it is highly evident that Federal Lease Sale 193 and its associated Draft SSEIS (BOEM 2014a) are unlawful, flawed, negligent, arbitrary, capricious, and otherwise not in accordance with law. Federal Lease Sale 193 and its associated Draft SSEIS (BOEM 2014a) violate: NEPA, the Clean Air Act, and the Environmental Assessment process; the ESA and legally mandated regulations of the USFWS, NOAA, and NMFS; and policies and regulations of the EPA. In addition FLS 193 and its associated Draft SSEIS (BOEM 2014a) contravene recommendations of the IPCC as supported by the UNEP, WMO, and globally by all 195 IPCC member nations; recent actions by the Executive Office of the President of the United States, including multilateral international agreements to substantially reduce greenhouse gas emissions; and regulations and guidelines of the Executive Office of the President of the United States advised by the CEQ.

In consideration of the substantive problems of FLS 193 and its associated Draft SSEIS (BOEM 2014) along with the significant and irrevocable harm FLS 193 and its associated activities would cause to Greenpeace USA, its 260,000 members across the United States, local Iñupiat communities and other U.S. citizens, numerous Federally listed and candidate Endangered and Threatened species, and countless other communities and nations throughout the world, Greenpeace USA as supported by its 260,000 members calls upon the U.S. Federal Government to vacate Federal Lease Sale 193 in its entirety or select Alternative II – No Lease Sale.

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Representative of Greenpeace Submittal | Attachment too voluminous to include in SEIS | All comments were reviewed and considered

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0261
Comment from John Deans, Greenpeace USA

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Organization: Greenpeace USA

General Comment

Attached are 36,823 additional public comments submitted by Greenpeace USA supporters. Many wrote their own comments, but where not edited, people signed their names to the following comment:

Title: Stop Arctic Drilling!

Comment:
Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk.

Representative of Greenpeace Submittal | Attachment too voluminous to include in SEIS | All comments were reviewed and considered

In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed.

Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014.

You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted.

It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development.

Attachments

SEIS last comments STA

SEIS last comments 1

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Last Name	First Name	City	State	Response Date	Response Text
Scaglotti	Giuliana	Pembroke Pines	FL	12/21/2014 8:43	All I want for Christmas is for this to stop! If nature could speak... there's enough oil being drilled else where. Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development.
Byrne	Michael	Ormond Beach	FL	12/22/2014 12:26	Does the risk need to be 100%? It must be extremely difficult to be caught between political and practical decisions. I don't envy you. I simply ask you to consider the impact not for the earth, but for people. As a species, how much more toxic impact can we absorb? What is the tipping point for the demise of the human race? I don't know, but action such as jeopardizing fragile ecosystems is another step toward that tipping point. Please consider not just the animal and environmental aspects of your decision. Please consider the impact on current and future generations of America's children. Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development.
Lucia	Lisa	Crawley	None	12/21/2014 13:58	Evil and wicked.Stop killing our planet for your selfish greed.!!!! Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly

Fisher	Charlotte	Bend	OR	12/21/2014 14:44	How many times must we learn the same lesson? Why are we even contemplating the continued destruction and depletion of out dwindling natural resources and environments? STOP THIS NOW! Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly urge you and
Bigelow	Betty	Seattle	WA	12/22/2014 0:56	It is insane to further promote Shell in this drilling project in the face of the Saudi's flooding the world market with oil, driving the price down. It would cost somewhere around $120 dollars a barrel to bring up crude oil that would be worth less than half that on the current market. Review and deny the lease this company and others were granted based on capital reality, no wishful thinking on the parts of the oil companies. Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development.
Rebold	Diana	Cheswick	PA	12/21/2014 15:50	Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development.

Yates	Tori	Lewisville	NC	12/21/2014 12:00	Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development.
Castillo	Rita	Springfield	OR	12/22/2014 3:32	Shell...shill...drill...SPILL !!! Have we learned NOTHING from the past ???? Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the Bureau of Ocean Energy Management (BOEM) predicts would be the result of a large oil spill in the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. According to your analysis, Mr. Cruikshank, there's a three out of four chance of a spill if you allow drilling in the Chukchi Sea, north of Alaska. This is an unacceptable risk. In April 2014, the National Academy of Science's National Research Council made it clear we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals. This should make it clear: drilling for oil in the US Arctic poses too large a threat to be allowed. Shell tried in to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire; and the EPA found that its equipment was inadequate to control pollution. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean. Even with its history of mishaps, this company made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. You have failed to account for the climate change impacts of the 4.3 billion barrels of oil being hauled out of the Chukchi Sea. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. It is clear that this lease sale is too dangerous to allow. I strongly urge you and Secretary Jewell to invalidate the lease sale and to make the Arctic off limits to oil exploration and development.

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Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0290
Comment from Shaun Goho, Emmett Environmental Law and Policy Clinic

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General Comment

Please see attached files.

Attachments

ELPC Comments

ELPC Comments Exhibit A

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December 22, 2014

By Electronic Submission to www.regulations.gov

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Docket ID No. BOEM-2014-0078-0001

Re: Comments on BOEM's Draft Second Supplemental Environmental Impact Statement (DSSEIS) for the Chukchi Sea Planning Area, OCS Oil and Gas Lease Sale 193

Harvard Law School's Emmett Environmental Law and Policy Clinic ("EELPC") welcomes the opportunity to comment on the Bureau of Ocean Energy Management's Draft Second Supplemental Environmental Impact Statement ("DSSEIS") for the Chukchi Sea Planning Area, OCS Oil and Gas Lease Sale 193.[1] EELPC appreciates the care with which the

[1] About the Commenters: The Emmett Environmental Law and Policy Clinic works on a variety of local, national, and international projects covering the spectrum of environmental law and policy issues under the direction of Professor Wendy B. Jacobs. The Emmett Clinic It has published several white papers and submitted comments to the Department of the Interior on various aspects of the regulation of offshore drilling generally and drilling in the Arctic in particular. It is the Emmett Clinic's position that rules of general applicability may not be adequately protective of the unique and sensitive Arctic marine environment. The Clinic's publications on these issues include the following: *Offshore Drilling Impacts: Strategies for Improving and Coordinating Access to Information* (Dec. 2014) (attached as Exhibit A); *Suggested Indicators of Environmentally Responsible Performance of Offshore Oil and Gas Companies Proposing to Drill in the U.S. Arctic* (Dec. 2013), *available at* http://hlsenvironmentallaw.files.wordpress.com/2014/09/indicators-paper-final_1-6-14.pdf; Comments on Draft Safety Culture Policy Statement for Offshore Drilling, Docket ID. BSEE-2012-0017 (Mar. 2013), *available at* http://blogs.law.harvard.edu/environmentallawprogram/files/2013/03/ELPC_BSEE-comments-FINAL_3-20-13.pdf; and *Recommendations for Improved Oversight of Offshore Drilling Based on a Review of 40 Regulatory Regimes* (June 2012), *available at* http://blogs.law.harvard.edu/environmentallawprogram/files/2013/10/Offshore-Drilling-White-Paper-FINAL_revised-10-2-13.pdf.

Bureau of Ocean Energy Management ("BOEM") has prepared the DSSEIS; given that the Chukchi Sea is a sensitive marine environment and a harsh, remote area in which to conduct oil and gas exploration, it is essential that the environmental risks associated with such exploration be properly assessed and managed.

Our comments focus on the DSSEIS's discussion of the risks associated with a very large oil spill ("VLOS") and with the potential use of dispersants to respond to a VLOS. In particular, we identify several critical flaws in the analysis contained in the DSSEIS that must be corrected to effectively address and minimize risk to this sensitive marine environment:

(1) The DSSEIS incorrectly assumes that dispersants can be an effective oil-spill response technique in "cold and ice infested waters" such as those in the Chukchi Sea. In fact, existing research shows that there is considerable uncertainty about the effectiveness of dispersants in such conditions. In addition, the studies relied upon by the DSSEIS contain multiple methodological shortcomings.

(2) Multiple scientific studies have shown that dispersants themselves can be harmful to wildlife, either directly—because of the toxicity of the chemicals in the dispersants—or indirectly—because the dispersants can increase the toxicity of the oil. The DSSEIS contains several omissions in its discussion of the potential impacts of dispersant use on wildlife, especially bowhead whales, and on the indigenous communities that depend on that wildlife.

(3) The DSSEIS assumes that a VLOS can be stopped within 74 days by the drilling of a relief well. This assumption is unreasonable for a spill that occurs near the end of the drilling season, because it does not take into account the possibility that winter conditions will delay the completion of a relief well until the next open-water season. The problems encountered by Shell during the 2012 drilling season highlight the shortcomings in this analysis.

I. The Evidence Cited in the DSSEIS Does not Support the Conclusion that "Dispersants Can Be Effective in Cold and Ice Infested Waters."

As part of its analysis regarding the environmental effects of a hypothetical VLOS, the DSSEIS properly includes a discussion on recovery and cleanup efforts. In it, BOEM recognizes

the use of chemical dispersants as a "response option" in the case of a VLOS in the Chukchi Sea, even though the Unified Plan for Alaska does not have any preapproved dispersant application zones in that area.[2] The DSSEIS assumes dispersants will be effective in the cold and ice-infested waters in the Arctic in a short and superficial discussion, even though dispersant effectiveness in the Arctic Ocean is still uncertain and a recent reported commissioned by the Bureau of Safety and Environmental Enforcement ("BSEE") questions the logistical feasibility of such a treatment plan. For the reasons discussed below, we believe that there are significant omissions and inaccuracies in the DSSEIS's discussion of the effectiveness of dispersants as a response option for a VLOS in the Chukchi Sea.

A. Dispersants and Dispersant Effectiveness Testing.

Chemical dispersants are a mixture of one or more surfactants with one or more solvents. A surfactant has a chemical structure consisting of an oleophilic ("oil-loving") end and an opposing hydrophilic ("water-loving") end. In essence, what the surfactants do is orient the water with its hydrophilic end and the oil with its oleophilic end in order to reduce the oil-water interfacial tension. In addition to the surfactants, dispersant blends contain solvents that "are used as carriers for the surfactants (which are often solids or highly-viscous liquids) and allow for the surfactants to penetrate the oil and migrate it to the oil-water interface."[3]

[2] The Alaska Federal/State Preparedness Plan for Response to Oil and Hazardous Substance Discharges/Releases, *available at* http://dec.alaska.gov/spar/perp/plans/uc.htm (last visited December 18, 2014). Currently, the Alaska Department of Environmental Conservation, the U.S. Coast Guard and the Environmental Protection Agency are in the process of amending Appendix I (Alaska Regional Response Team Oil Dispersant Authorization Plan) and the proposed draft does not have any preauthorized dispersant application zones in the Chukchi Sea area. *See* Draft of September 25, 2013 Alaska Regional Response Team Oil Dispersant Authorization Plan (Revision I), *available at* http://dec.alaska.gov/spar/perp/docs/ARRT%20Oil%20Dispersant%20Authorization%20Plan_Draft%209-25-13.pdf.

[3] Southwest Research Institute, *Dispersant Effectiveness Literature Synthesis: Final Report*, at 2-1 (2014).

Mervin Fingas, a widely recognized authority on oil spill cleanup methods and for more than 30 years the Chief of the Emergencies Science Division of Environment Canada, has explained that there are three main motivations for the use of dispersants during an oil spill: (1) to reduce the impact of oil on shoreline, (2) to reduce the impact on birds and mammals in the water surface, and (3) to promote the biodegradation of oil in the water column.[4]

The effectiveness of a dispersant is typically understood as "the amount of oil that the dispersant puts into the water column compared to the amount of oil that remains on the surface."[5] There are many factors that influence dispersant effectiveness, including the type of oil is being treated (oil composition); sea energy; oil weathering; type, amount, and composition of the dispersant used; and the temperature and salinity of the water.

Dispersant effectiveness is typically studied in one of three ways: (1) laboratory tests; (2) tank tests; or (3) field tests. Laboratory tests can be performed at the lowest cost, but "[a] major disadvantage is . . . that it is difficult to scale the results of these tests to predict performance in the field."[6] Therefore, "[r]esults obtained from the laboratory testing should . . . be viewed as representative only and not necessarily reflecting what would take place in actual conditions."[7] Tank tests are performed in wave tanks that can hold much larger volumes than are used in laboratory tests. Although tank tests are more realistic than laboratory tests, they still have shortcomings, including that "the physical characteristics of wave tanks imply that the encounter

[4] Merv Fingas, *Oil Spill Dispersants: A Technical Summary*, *in* OIL SPILL SCIENCE AND TECHNOLOGY: PREVENTION, RESPONSE, AND CLEANUP 435, 435-36 (Mervin Fingas ed., 2011).

[5] *Id.* at 452.

[6] *Id.* at 467.

[7] Merv Fingas, *A Review of Literature Related to Oil Spill Dispersants 2011-2014*, at 4 (June 2014), *available at* http://www.pwsrcac.net/committees/xcom/documents/PWSRCACDispersantReportFingas2014.pdf [hereinafter Fingas, *A Review of Literature*].

probability of the dispersant with the oil slick will be higher than can be achieved during a real spill response."[8] In addition, most tank tests fail to account for the skinning of the oil that occurs while weathering, making penetration of dispersants in the field more difficult.[9] Finally, field trials try to simulate real time oil spill environments. While they are the most realistic type of test, they also face several methodological challenges, including the impossibility of measuring remaining oil thickness and the need to establish a mass balance between oil in the water column and on the surface, which is difficult to achieve.[10] As a result, "it is very difficult to measure the concentration of oil in the water column over large areas and at frequent enough time periods. . . . Any field measurement at this time is best viewed as an estimate."[11]

More generally, as the National Research Council of the National Academies of Sciences has reported, dispersant effectiveness testing is subject to a series of common and systematic errors. These errors include: ignoring the evaporation of volatile compounds, the use of poor analytical methods, and incomplete recovery of floating oils.[12] All of these errors "introduce a positive bias in the estimates of dispersant effectiveness."[13]

Even with these shortcomings and positive bias, experiments have a decidedly mixed record in demonstrating dispersant effectiveness. "[V]arious tests show highly different results depending on how they are constructed and operated."[14]

[8] Fingas, *supra* note 4, at 467.

[9] *Id.* at 467.

[10] *Id.* at 454-55.

[11] Fingas, *A Review of Literature*, *supra* note 7, at 4.

[12] NATIONAL RESEARCH COUNCIL, OIL SPILL DISPERSANTS: EFFICACY AND EFFECTS 78 (2005).

[13] Fingas, *supra* note 4, at 454.

[14] *Id.* at 563.

Moreover, if the dispersants are to do more than just move the oil around, they must also promote biodegradation.[15] In theory, dispersant application can speed up biodegradation by increasing the surface-to-volume ratio of the spilled oil, thereby making more of it available to microorganisms.[16] However, the relationship between dispersion and biodegradation is not simple. For one thing, "surfactants can interfere with the attachment of hydrophobic bacteria to oil droplets, making the process [biodegradation] very complex to understand."[17] In addition, as with dispersant effectiveness more generally, the effect of dispersants on the biodegradation of the spilled oil depends on various factors: the chemical characteristics of the dispersant; the hydrocarbons; the microbial community; nutrient concentrations; oil-water ratios; and mixing energy.[18]

Research into the effect of dispersants on the rate of the biodegradation of spilled crude oil has shown mixed results: although some studies show that biodegradation is stimulated, many others show inhibition or no effect at all.[19] Furthermore, "the most toxic components of the oil, the biodegradation of PAHs, have never been shown to be stimulated by dispersants."[20] Finally, many of the existing reports on the effect of dispersants on oil biodegradation suffer from methodological shortcomings. For example, "many experimental systems used to investigate these effects might be seen as inappropriate to represent the environment because they applied

[15] Biodegradation "is generally believed to be the dominant process that removes petroleum compounds from the environment." Kelly M. McFarlin , et al., *Biodegradation of Dispersed Oil in Arctic Seawater at -1 °C*, 9 PLOS ONE e84297, at 1 (2014).

[16] Because most compounds in crude oil are not water-soluble, any biodegradation of oil components has to occur at the surface of the oil. Roger C. Prince, et al., *The Primary Biodegradation of Dispersed Crude Oil in the Sea*, 90 CHEMOSPHERE 521, 521 (2013).

[17] Fingas, *supra* note 4, at 535.

[18] *Id.*

[19] *Id.*

[20] *Id.* at 536.

high mixing energy in an enclosed, nutrient-sufficient environment and allowed sufficient time for microbial growth."[21] By contrast, "[m]icrobial growth on open ocean slicks is likely to be nutrient limited and may be slow relative to other fate processes, many of which are resistant to biodegradation."[22]

B. The DSSEIS Incorrectly Concludes that Dispersants Have Been Demonstrated to be Effective in Arctic Conditions.

Experienced and knowledgeable research groups have concluded that the effectiveness of dispersants in Arctic conditions is little-studied and poorly understood.[23] In addition, the biodegradation process "has not been thoroughly studied in the Arctic, and questions remain as to whether biodegradation is a significant process in cold conditions."[24]

Nevertheless, the DSSEIS concludes that "[r]esearch has shown that dispersants can be effective in cold and ice infested waters when employed in a timely manner." DSSEIS at 425. In support of this conclusion, the DSSEIS relies on six reports on dispersant effectiveness, five from tank tests and one summary report that briefly discusses three field tests.[25] Notably, these

[21] *Id.* at 539.

[22] *Id.*

[23] *See, e.g.*, NATIONAL RESEARCH COUNCIL, RESPONDING TO OIL SPILLS IN THE U.S. ARCTIC MARINE ENVIRONMENT 84 (2014) ("There has been considerable debate over the effectiveness of chemical dispersants on crude oil degradation at low seawater temperatures. The main concern is that as temperature decreases, chemical processes slow down and oil viscosity increases, making it more difficul to disperse."); NUKA RESEARCH AND PLANNING GROUP, LLC & PEARSON CONSULTING, LLC, OIL SPILL PREVENTION AND RESPONSE IN THE U.S. ARCTIC OCEAN: UNEXAMINED RISKS, UNACCEPTABLE CONSEQUENCES 80 (2010) ("Many questions remain about the efficacy of dispersants in Arctic waters, the potential toxicities, and the operational feasibility of applying dispersants in ice-infested waters.") (report commissioned by the Pew Environment Group); WORLD WILDLIFE FUND, NOT SO FAST: SOME PROGRESS IN SPILL RESPONSE, BUT US STILL ILL-PREPARED FOR ARCTIC OFFSHORE DEVELOPMENT 5 (2009) ("The use of chemical dispersants as a viable response tool for arctic waters in Alaska is still many years off.").

[24] McFarlin, et al., *supra* note 15, at 1.

[25] Specifically, the SEIS cites four tank test reports by S.L. Ross Environmental Research Ltd. published in 2002, 2003, 2006 and 2007; one tank test report by Randy Belore from S.L. Ross presented in the International Oil Spill Conference Proceedings of April 2003; and a summary report on three field tests by SINTEF published in 2010. DSSEIS at 425.

reports do not support the DSSEIS's categorical statement that dispersants can be effective in such conditions because, as discussed below, they suffer from systematic experimental design errors that create a positive bias towards conclusions of effectiveness.

The most recent tank test report,[26] published in 2007, tested the effectiveness of Corexit 9500 dispersant in cold water on four Alaskan crude oils, including Alaskan North Slope crude, using the Ohmsett dispersant effectiveness test method.[27] As described by the report, the resulting dispersant effectiveness (DE) was calculated by taking the "%Dispersed/Lost"[28] estimated value for each dispersant application minus the "%Dispersed/Lost" value for the control experiment for the same oil.[29] Under this analytical methodology, the report concluded that Corexit 9500 was an effective dispersant for Alaskan North Slope oil when it is air sparged (weathered) by 15%.

There are several reasons to question this conclusion, however. First, this report was based on a wave tank experiment and, as the National Research Council has noted, "the physical characteristics of most wave tanks . . . imply that the encounter probability of the dispersant with the oil slick will be higher than can be achieved during a real spill response."[30] This positive

[26] S.L. Ross Environmental Research, *Corexit 9500 Dispersant Effectiveness Testing in Cold Water on Four Alaskan Crude Oils* (2007). This report utilizes the same test equipment and procedures as those used in the 2006 report and compares its results with those obtained in the 2003 and 2006 reports.

[27] The Ohmsett test method consists of "laying down a uniform slick of a known quantity of oil on the surface of the Ohmsett tank, spraying the oil with dispersant at a pre-determined dose, subjecting the oil to wave action (breaking waves) for 30 min and then collecting the remaining oil on the surface at the end of the mixing period." Randy C. Belore, et al., *Large-scale Cold Water Dispersant Effectiveness Experiments with Alaskan Crude Oils and Corexit 9500 and 9527 Dispersants*, 58 MARINE POLLUTION BULL. 118, 119 (2009).

[28] "%Dispersed/Lost" estimated value is the percentage of oil not accounted for by collection or evaporation estimates.

[29] S.L. Ross Environmental Research, *supra* note 26, at 6.

[30] NATIONAL RESEARCH COUNCIL, *supra* note 12, at 90.

bias means that "wave-tank tests [provide] upper limits on operational effectiveness."[31] Second, the report did not use high-quality gas chromatography-mass spectrometry (GC-MS) techniques to measure dispersant effectiveness, instead estimating dispersant effectiveness by comparing the amount of oil spilled to that collected (or not-collected) from the surface after each experiment.[32] This analytical methodology does not account for the amount of residual oil compounds on the surface, or the potential for dispersed oil to later resurface.[33] Lastly, only half of the tests reported in the study were completed at surface water temperatures representative of Arctic conditions (between -1 and -5° C); for the other half, the water temperatures were between 3 and 9° C.[34]

The DSSEIS also relies on a report prepared by SINTEF describing field tests.[35] In these experiments, Troll B crude oil was released into water that had an ice coverage of 70-80% for approximately six hours before dispersant application, and into water with an ice coverage of 80-90% six days before dispersant application.[36] However, during both oil applications, no wave action took place and energy was added by the use of a thruster or a water jet. In situ UV Fluorescence, LISST droplet size distribution measurements, and water sampling were used to monitor the concentration of the dispersed and dissolved oil in the water column. This

[31] *Id.*

[32] *See* Fingas, *A Review of Literature*, *supra* note 7, at 9 ("It should be made very clear that only high-quality GC/MS techniques produce a true quantitative means.").

[33] *See id.* at 4 (explaining that "dispersion is temporary and effectiveness measures should always relate this to the time after the dispersant application that the measure was taken").

[34] According to the report, midway through testing, experiments had to be postponed because the tank surface froze. Testing was resumed mid-March when air temperatures had increased considerably and a chiller was no longer available to cool the tank water. S.L. Ross Environmental Research, *supra* note 26, at 4.

[35] SINTEF, *Joint Industry Program on Oil Spill Contingency for Arctic and Ice-Covered Waters: Summary Report* (2010).

[36] *Id.* at 23-24.

experiment was more realistic than the wave tank studies, but still had notable shortcomings. First, it also failed to use GC-MS techniques. As Dr. Fingas has explained, because "[t]he composition of the oil changes with respect to aromatic content as it weathers and is dispersed, with the concentration of aromatics increasing," a "fluorometer reading will always remain a relative value and even with careful 'calibration' can only give indications that are as much as order-of-magnitude from the true value."[37] In addition, since the effectiveness values of a field test depend on establishing a mass balance between oil in the water column and on the surface, and this balance is so difficult to achieve, most results from such experiments are questionable.[38]

In addition, these studies say nothing about the biodegradation of dispersed oil. As noted above, one of the main justifications for the use of dispersants is the assertion that the chemical dispersion of oil will speed up the biological degradation of oil by marine microorganisms. If the dispersed oil is not biodegraded, then all that the application of dispersants will accomplish is the transfer of oil from one part of the ecosystem to another. To conclude that dispersants are effective at remediating an oil spill in the Chukchi Sea, it is necessary to demonstrate that the dispersed oil would be biodegraded.

Whether biodegradation will occur in Arctic waters and, if so, at what rate, has long been identified as a key uncertainty regarding dispersant effectiveness in the Arctic.[39] The composition of the planktonic community varies in different parts of the ocean; therefore, the fact that microorganisms from one location may effectively biodegrade oil does not necessarily mean that those from another location will produce similar results. In addition, biological

[37] Fingas, *A Review of Literature*, *supra* note 7, at 9.

[38] Fingas, *supra* note 4, at 454.

[39] McFarlin, et al., *supra* note 15, at 1 ("Biodegradation is generally believed to be the dominant process that removes petroleum compounds from the environment, but the process has not been thoroughly studied in the Arctic, and questions remain as to whether biodegradation is a significant process in cold conditions.").

processes in general occur at slower rates at lower temperatures; all other things being equal, the waters of the Chukchi Sea, where temperatures typically hover around 0 to 5 degrees Celsius during the open water season,[40] should therefore exhibit slower rates of biodegradation than occur in warmer waters.

Two recent studies highlight the likelihood of different rates of biodegradation in the Chukchi Sea compared to warmer waters.[41] These studies both looked at the rate of biodegradation of dispersed crude oil at low concentrations intended to mimic the concentrations that would be found after a real spill. Both studies used Alaska North Slope crude oil, but one measured biodegradation in water collected from the New Jersey shore and maintained at 8 degrees Celsius, while the other experiment was performed in water collected in the Chukchi Sea and maintained at minus 1 degree Celsius. While biodegradation occurred in both experiments, the rate at which it occurred differed dramatically. In the experiment with New Jersey seawater at 8°C, 82% of the hydrocarbons in the crude oil had biodegraded after 41 days.[42] By contrast, in the experiment with Chukchi Sea seawater at -1°C, only 61% had biodegraded after 63 days.[43] In other words, 25% less oil was biodegraded under Chukchi Sea conditions, even after 50% more time.

Even these numbers might create a misleadingly optimistic impression. First, the detected rate of biodegradation slowed considerably over the course of the experiments; for example, in the -1°C experiment, 54% had biodegraded after 28 days, but only an additional 7%

[40] William W. Gardiner, et al., *The Acute Toxicity of Chemically and Physically Dispersed Crude Oil to Key Arctic Species under Arctic Conditions during the Open Water Season*, 32 ENVTL. TOXICOLOGY & CHEMISTRY 2284, 2284 (2013).

[41] *See* Prince, et al., *supra* note 16; McFarlin, et al., *supra* note 15, at 1.

[42] Prince, et al., *supra* note 16, at 523.

[43] McFarlin, et al., *supra* note 15, at 3.

did over the next 35 days.[44] Therefore, the time necessary for the complete biodegradation of the hydrocarbons in the oil would likely be much longer than the length of the experiment. In addition, the methods used in the experiments "indicate[] only the initiation of the biodegradation process—commonly known as primary biodegradation—not their ultimate biological oxidation to water and CO_2."[45] Finally, these studies "detect only the hydrocarbons in crude oil, and do not address the potential biodegradability of the asphaltenes and resins."[46] For all of these reasons, the effectiveness of dispersants in promoting the biodegradation of oil after a spill in the Arctic remains very much an open question.

Finally, even if dispersants were effective in Arctic waters once they had been applied to an oil slick, the extreme conditions in the Chukchi Sea could make it very difficult to apply dispersants to an oil slick in the first place. Earlier this year, the NAS recognized that the Arctic "impose[s] many challenges for oil spill response—low temperatures and extended periods of darkness in the winter, oil that is encapsulated under ice or trapped in ridges and leads, oil spreading due to sea ice drift and surface currents, reduced effectiveness of conventional containment and recovery systems in measurable ice concentrations, and issues of life and safety of responders."[47] A recently-published study commissioned by the BSEE concluded that dispersant application would be virtually impossible in Chukchi Sea winter conditions and that

[44] *Id.*

[45] *Id.*

[46] Prince, et al., *supra* note 16, at 524.

[47] NATIONAL RESEARCH COUNCIL, RESPONDING TO OIL SPILLS IN THE U.S. ARCTIC MARINE ENVIRONMENT, *supra* note 23, at 79.

even in the summer, aerial dispersant application would be impossible approximately half of the time and vessel application would be impossible approximately 20% of the time.[48]

In summary, even though chemical dispersants have been used for decades as a response to oil spills elsewhere in the United States, there is still much to learn about their effectiveness in Arctic conditions. When chemical dispersants are used as a response to an oil spill, the immediate effect (if the dispersant is effective) will be to transport the hazardous oil, mixed with new chemical components, from the surface to the water column. From there, as the studies show, it is unclear how long it will take for the oil to biodegrade. The DSSEIS therefore should not assume that dispersants will be an effective response option should a VLOS occur.

II. The DSSEIS Contains an Inadequate Discussion of the Impacts of Dispersants on Wildlife and Therefore of the Impacts on Indigenous Communities Who Depend on that Wildlife.

Not only is it unclear that dispersants could be effectively used to disperse and promote the biodegradation of an oil spill in the Chukchi Sea, but there is a significant and growing body of evidence suggesting that the dispersants themselves can be harmful to wildlife. Although the DSSEIS discusses some of these potential harms, it also contains important omissions. As a result, its analysis of the potential impacts of dispersant use in response to a VLOS on both wildlife and on the indigenous communities that depend on that wildlife are inadequate.

The Chukchi Sea is home to a diverse array of marine species. "Chukchi Sea benthic communities are among the most abundant and diverse in Arctic regions due to the primary productivity created by phytoplankton populations." DSSEIS at 70. "The U.S. Chukchi Sea and western Beaufort Sea support at least 98 fish species representing 23 families." DSSEIS at 71. A variety of seabirds and shorebirds pass through the lease sale area. Marine mammals in the

[48] Nuka Research and Planning Group, LLC, *Estimating an Oil Spill Response Gap for the U.S. Arctic Ocean* 47-48 (Sept. 10, 2014).

planning area include the bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, and polar bear, all of which are listed as endangered or threatened under the Endangered Species Act, as well as the Pacific walrus, which is a candidate species. DSSEIS at 85. Several of these species are of significant nutritional, economic, cultural, and spiritual significance to indigenous communities living along the coast of the Chukchi Sea.

A. The DSSEIS Ignores Important Potential Impacts of Dispersant Use on Bowhead Whales and Other Species.

It is well-established that dispersants can harm many marine species, either directly or by exacerbating the harmfulness of the dispersed oil. Early dispersant applications resulted in devastating wildlife mortality.[49] Although modern dispersants have been reformulated to reduce their toxicity, they still contain multiple compounds known to be toxic and/or carcinogenic,[50] and have been shown directly in experiments to be toxic to marine organisms.[51] In addition, aside from the direct toxicity of the dispersant chemicals, dispersants dramatically increase the number of oil droplets in the water and the bioavailability of this oil to marine organisms.[52] In addition, very little is known about the long-term effects of dispersant exposure, including

[49] Fingas, *supra* note 4, at 519 ("[T]he use of dispersants during the *Torrey Canyon* episode in Great Britain in 1968 caused massive damage to intertidal and subtidal life.").

[50] Toxipedia Consulting Services & Earthjustice, *The Chaos of Clean-Up: Analysis of Potential Health and Environmental Impacts of Chemicals in Dispersant Products* 11 (2011) (listing ingredients of Corexit 9500 and 9527 that are confirmed animal carcinogens, known toxins, and suspected neurotoxicants); *cf.* Carl E. Brown, et al., *Environment Canada's Methods for Assessing Oil Spill Treating Agents*, *in* OIL SPILL SCIENCE AND TECHNOLOGY: PREVENTION, RESPONSE, AND CLEANUP 643, 645 (Mervin Fingas ed., 2011) ("Toxicity has been one of the primary concerns with the use of dispersants.").

[51] NATIONAL RESEARCH COUNCIL, AN ECOSYSTEM SERVICES APPROACH TO ASSESSING THE IMPACTS OF THE DEEPWATER HORIZON OIL SPILL IN THE GULF OF MEXICO 82 (2013) ("There is some evidence that chemically dispersed oil and some dispersant compounds are toxic to some marine life, especially those in early life stages.").

[52] Fingas, *A Review of Literature*, *supra* note 7, at 10.

genotoxicity and endocrine disruption, because virtually all toxicity experiments look only at acute effects.[53]

The DSSEIS greatly underestimates the impacts of dispersants on marine species present in the Chukchi Sea. For example, as to all species present in the Chukchi Sea, the DSSEIS ignores recent studies on the toxicity of dispersants and dispersed oil. With regard to bowhead whales and other cetaceans in particular, the DSSEIS ignores the potential bioaccumulation of dispersant components as well as the risk of harm from inhalation of dispersants.

1. Toxicity Studies

The DSSEIS makes a few brief references to the toxicity of dispersants and dispersed oil.[54] These statements, however, are virtually unchanged from the 2011 SEIS and therefore ignore several more recent studies that have provided new evidence of such toxicity. Because some of these studies suggest that dispersants are more hazardous to wildlife than understood in 2011, the analysis needs to be updated to reflect this new information.

Some recent studies have found that dispersants are directly toxic to mammalian cells. For example, one paper reported that dispersants caused mitochondrial malfunctions in and apoptosis of mammalian cells.[55] Another study found that Corexit 9500 and 9527 were both

[53] Fingas, *A Review of Literature*, *supra* note 7, at 15; Mengyuan Zheng, et al., *Evaluation of Differential Cytotoxic Effects of the Oil Spill Dispersant Corexit 9500*, 95 LIFE SCIENCES 108, 116 (2014) (reporting that "although Corexit appears to be less acutely toxic [to mammalian cells in vitro than certain highly toxic compounds], its long-term toxicity is currently unknown").

[54] For example, it acknowledges that "[c]hemically dispersed oil is thought to be more toxic to water column organisms than physically dispersed oil." DSSEIS at 437. It also recognizes that "[t]he application of dispersants can cause sinking of droplets and subsequent aggregation on the benthic surface and increased exposure of small organisms to oil due to the increased surface area from small particles created by dispersants." DSSEIS at 448. The DSSEIS also mentions the increased toxicity of dispersed oil to fish (DSSEIS at 455), and the possibility of direct harms to polar bears and Pacific walrus, including "skin irritations, respiratory impacts or impacts to sensitive tissues around the eyes, nose or mouth" (DSSEIS at 514, *see* DSSEIS at 509).

[55] Zheng, et al., *supra* note 53.

cytotoxic and genotoxic to sperm whale skin cells.[56] Other research has focused on the increased toxicity of dispersed oil; one study found that chemically-dispersed oil was 35-to-300 times more toxic to trout embryos than oil that was not treated with chemical dispersants.[57] Still other researchers have examined both effects at the same time. For example, one paper found that nondispersed oil "did not induce acute toxicity," while "[d]ispersant alone . . . was shown to be acutely toxic within the range of the manufacturer's recommended application" and "dispersed oil remained more toxic than either oil or COREXIT 9500 even after 6 mo[nths] of biodegradation at low salinity."[58]

Of particular relevance, some studies found that chemically-dispersed oil is toxic to organisms that are prey for bowhead whales and other marine mammals. Thus one paper found that chemically-dispersed oil is significantly more toxic to copepods than oil alone.[59] Another found a similar effect on multiple types of microzooplankton.[60] Furthermore, the Wise study mentioned above shows that dispersants can be destructive to the skin of whales in particular. Without an analysis or even a mention of recent studies such as these, the DSSEIS lacks crucial information relating to the wellbeing of these species.

[56] Catherine F. Wise, et al., *Chemical Dispersants Used in the Gulf of Mexico Oil Crisis are Cytotoxic and Genotoxic to Sperm Whale Skin Cells*, 152 AQUATIC TOXICOLOGY 335 (2014).

[57] Dongmei Wu, et al., *Comparative Toxicity of Four Chemically Dispersed and Undispersed Crude Oils to Rainbow Trout Embryos*, 31 ENVTL. TOXICOLOGY CHEMISTRY 754 (2012).

[58] Adam J. Kuhl, et al., *Dispersant and Salinity Effects on Weathering and Acute Toxicity of South Louisiana Crude Oil*, 32 ENVTL. TOXICOLOGY CHEMISTRY 2611, 2618-19 (2013).

[59] Rodrigo Almeda, et al., *Ingestion and Sublethal Effects of Physically and Chemically Dispersed Crude Oil on Marine Planktonic Copepods*, 23 ECOTOXICOLOGY 988 (2014). As explained in the National Marine Fisheries Service's *Biological Opinion on Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska* (2013), copepods are one of the primary prey of bowhead whales, *id.* at 69.

[60] Rodrigo Almeda, et al., *Toxicity of Dispersant Corexit 9500A and Crude Oil to Marine Microzooplankton*, 106 ECOTOXICOLOGY & ENVTL. SAFETY 76 (2014). "Concentrations of zooplankton appear necessary for bowhead whales and other baleen whales to feed efficiently to meet energy requirements." NMFS, *supra* note 59, at 69.

In addition, although the DSSEIS discusses the toxic impact of oil on bowhead whales—*see, e.g.*, DSSEIS at 495-496, it fails to take into account the impact of dispersants in these assessments. For example, the DSSEIS states that in the event of a spill:

> [i]t would be likely that surface feeding bowheads would ingest surface and near surface oil fractions with their prey, which may or may not be contaminated with oil components. Incidental ingestion of oil fractions that may be incorporated into bottom sediments can also occur during near-bottom feeding. Ingestion of oil may result in temporary and permanent damage to bowhead endocrine function and reproductive system function; and if sufficient amounts of oil are ingested mortality of individuals may also occur.

DSSEIS at 495. Even though the DSSEIS elsewhere states that "chemical oil dispersant derived compounds could be consumed by bowheads feeding on prey anywhere in contaminated water column layers to the sea floor," DSSEIS at 474, these analyses do not consider that near surface oil fractions could be combined with dispersants, or that the combination of oil and dispersants—near surface, in the water column, or at the sea floor—is potentially more toxic than oil alone.

Further, and more generally, the DSSEIS does not thoroughly address the possibility that organisms' susceptibility to toxic components within dispersants may vary depending on their lifecycle stage at the time when dispersants are applied to their habitats.[61] By contrast, the DSSEIS focuses on sensitive life cycle stages in its discussion of some other impacts. *See* DSSEIS at 415 (discussing effects of *shockwaves* on fish eggs and larvae); *id.* at 449 (discussing "articles that document the injurious and acute effects of *crude oil* on the embryology, physiology, genetics, and behavior of various fish species and fish life stages."); *id.* at 474 ("Maternal exposure to *crude oil* during pregnancy may negatively impact the birth weight of young.") (emphases added). *See also* 2007 FEIS at IV-60 (detailing effects of oil on organisms

[61] The DSSEIS does address the possibility that cleanup activities will "occur in or near lagoons or nearshore feeding areas, molting, or birthing habitats," and it states that "beluga would abandon these areas for as long as spill related activities persisted." *See* DSSEIS at 497. This section does not address the physiological or embryological effects of dispersants on whales, however.

at different stages within lifecycle, but not mentioning dispersants). Though the DSSEIS states that "[a]pplication of dispersants can cause toxic effects in fish and particularly fish eggs and larvae," it does not go on to examine the implications of that fact and whether it should affect the range of times during the year at which it would be reasonable to apply dispersants. *See* DSSEIS at 455.

2. Bioaccumulation

Although the DSSEIS recognizes that bowheads may ingest oil while feeding at the benthic surface, DSSEIS at 474, and that polycyclic aromatic compounds ("PACs") may bioaccumulate in bowhead prey, *id.* at 475, it does not discuss the role that dispersants may play in enhancing these harmful impacts. As BOEM acknowledges elsewhere in the DSSEIS, "[t]he application of dispersants can cause sinking of droplets and subsequent aggregation on the benthic surface . . . and increased exposure of small organisms to oil due to the increased surface area from small particles created by dispersants." *Id.* at 448 (citations omitted). In fact, as the aftermath of the Deepwater Horizon disaster has shown, dispersant use can lead to oil settling on the sea floor in quantities that are detectable years after the spill.[62] Bowhead whales are known to inhabit and feed in the benthic regions in which such hydrocarbon contamination can persist. DSSEIS at 279, 448 ("The application of dispersants can cause sinking of droplets and subsequent aggregation on the benthic surface . . . ."), 487. As a result of these processes, bowheads can be expected to consume more oil while feeding at the sea bottom and more oil derivatives can be expected to bioaccumulate in bowhead prey if dispersants are used in response to a VLOS. The DSSEIS does not discuss these risks associated with dispersant use.

[62] *See* David L. Valentine, et al., *Fallout Plume of Submerged Oil from* Deepwater Horizon, 111 PROC. NAT'L ACAD. SCI. 15906, 15909 (2014) (identifying "a fallout plume of hopane from the *Deepwater Horizon* event that spans an area of 3,200 km^2 and by proxy represents 4-31% of the oil estimated to have been trapped in the deep ocean").

In addition, the fact that "[w]hales can experience several polluting events within a lifetime," DSSEIS at 476, suggests that they are particularly susceptible to the dangers posed by dispersants and the bioaccumulation of toxins that they contain. Moreover, "[m]any benthic invertebrates [on which whales feed] are filter feeders, which tend to concentrate hydrocarbons through bioaccumulation."[63] Unfortunately, however, the DSSEIS section on Cumulative Effects does not mention chemical dispersants even once in its 83 pages of analysis. *See* DSSEIS at 567-650. The failure to consider the cumulative effects of dispersants on wildlife like the bowhead whale is particularly problematic because research has demonstrated that toxic dispersant-oil mixtures can remain suspended in the water column for months and extend for many miles. Because the "the use of dispersants in the Arctic . . . is foreseeable," their adverse impacts must be analyzed in the section of the DSSEIS that addresses cumulative effects. *See* DSSEIS at 509; 2007 FEIS at IV-82 PDF page 328 ("The considerable potential longevity of the bowhead whale, coupled with its migratory use of the habitat, is important to consider in evaluating potential effects, and especially *cumulative effects*, of the Proposed Action.") (emphasis added).

3. Inhalation

Another impact of dispersants on bowhead whales that the DSSEIS ignores is the risk of harm from inhaling dispersant vapors at the surface of the water. The DSSEIS recognizes that "[t]he greatest threat to large cetaceans [from a VLOS] would be inhalation of fresh oil toxic hydrocarbon fractions." DSSEIS at 473. It also notes the danger to polar bears of "inhalation or exposure to toxic fumes from cleanup products," DSSEIS at 512, but it does not express similar concern for bowhead whales—which, in contrast to polar bears, cannot breathe from anywhere

[63] NMFS, *supra* note 59, at 343.

but the water to which dispersants would be applied. In addition, Fingas has reviewed recent publications, including some looking at cleanup workers from the Gulf oil spill, and concluded that "tests of inhalation models showed that there might be a concern over human inhalation of dispersant vapors."[64] Although he goes on to note that "the levels of exposures may not be pertinent to at sea applications,"[65] bowhead whales and other cetaceans do not have the option of retreating to the shore like humans do.

In sum, the DSSEIS ignores important new research on the toxicity of dispersants and dispersed oil. It also fails to address significant mechanisms by which dispersants can harm bowhead whales and other Chukchi Sea wildlife.

B. The DSSEIS Insufficiently Analyzes the Impacts of Dispersant Use on Indigenous Communities.

Subsistence hunting by communities along the coast of the Chukchi Sea includes harvesting of whales, seals, walruses, ocean fish, and birds. DSSEIS at 528. Marine species, including marine mammals and fish, make up approximately 60% of a coastal community's diet in this area. DSSEIS at 529. "The ocean is frequently referred to in public testimony as 'the Inupiat garden.'" *Id.* at 339. Several indigenous communities rely on bowhead whales, in particular, for subsistence.

The DSSEIS recognizes that cleanup efforts, ostensibly including dispersant use, can have "a major effect on subsistence harvests and subsistence users, who would suffer impacts on their nutritional and cultural well-being." DSSEIS at 345. A significant contribution to this impact is derived from the problem of perceived contamination, in which subsistence hunters avoid certain prey because the degree of contamination of these animals after an oil spill may be

[64] Fingas, *A Review of Literature*, *supra* note 7, at 28.

[65] *Id.*

unknowable. The DSSEIS acknowledges perceived contamination, stating that "[a]n oil spill affecting *any* part of the migration route of the bowhead whale could taint this resource leaving them less desirable and possibly alter or stop the subsistence hunt." DSSEIS at 339, 529 (emphasis added). In addition, the DSSEIS recognizes that "[o]il-spill contamination of subsistence foods, actual or perceived, is a serious concern since traditional foods are the cornerstone of nutrition, culture, and social systems in [Alaskan Native] communities." DSSEIS at 555. However, BOEM does not acknowledge the significance of dispersant use, in particular, on this phenomenon.

By sinking spilled oil into the water column, dispersants increase the probability that marine mammals such as bowhead whales will come into contact with the dispersed oil and that they will consume organisms that have been exposed to chemically dispersed oil. In this way, dispersants aggravate not only the actual contamination of subsistence hunters' target species, but also the perceived contamination.

Mechanical extraction, by definition, removes oil and its harmful chemical components from the environment of aquatic organisms. Though the DSSEIS acknowledges the threat of actual or perceived tainting of indigenous resources like whale meat, it does not analyze the possibility that that the use of dispersants, as opposed to mechanical extraction, can exacerbate such actual or perceived tainting of those resources. Because mechanical extraction could limit the extent of actual or perceived contamination by comparison to dispersant use, the EIS should consider an alternative involving no dispersant use in response to a VLOS.

III. The DSSEIS's Estimated Maximum Length of Time to Drill a Relief Well, and Hence Maximum Size of a VLOS, is Unrealistically Low.

The DSSEIS's analysis of the impacts of a VLOS is premised on the assumption that a spill "would be stopped within 74 days of the initial event." DSSEIS at 421. This estimated

period is "the longest of three estimated time periods for completing a relief well" as provided by BSEE's Alaska OCS Regional Office Field Operations. DSSEIS at 421.[66] In particular, this estimate is based on the conclusion that it would take only 30 days to transport a drilling rig across the Pacific Ocean, which could then drill a relief well within an additional 39 days. BOEM considers the 74-day estimate to be both reasonable and conservative given the fact that there are a number of actions that could be employed within that period that could halt the spill sooner. DSSEIS at 428-29. Even if BOEM's conservative estimate were correct, it would allow at least 2.2 million barrels of oil to spill into the pristine waters of the Chukchi Sea. DSSEIS at 420. Worse, the estimate unrealistically ignores the likelihood that a spill that occurs near the end of the drilling season would not be stopped until after the beginning of the following open-water season. The DSSEIS should therefore be revised to reflect a more realistic maximum size for the spill and, as NOAA has proposed, to include as an alternative a lease allowing a shorter drilling season.[67]

A. If a VLOS Occurs Near the End of the Drilling Season, it is Likely to Take Until the Following Open-water Season to Complete a Relief Well.

The "event" that would trigger the VLOS could occur at any time between July 15th and October 31st. If the spill occurred toward the end of this period, then relief operations would have to take place after the end of the open water season, which creates a significant risk that such operations could be delayed or rendered impossible until the following spring. For

[66] According to the BSEE AKOCSR Field Operations estimates, the time required to drill a relief well and "kill" the discharge following a VLOS at a well is: (1) 39 days if the operator is able to use the original platform and equipment to drill the relief well; (2) 46 days if the operation has to use a second drilling platform and equipment propositioned "in-theater" (within the Chukchi Sea) to drill the relief well; and (3) 74 days if the operation has to use a second drilling platform and equipment from the Northern Hemisphere Pacific Rim to drill the relief well. DSSEIS at 421, table 4-49.

[67] *See* NOAA Comments, ID No. BOEM-2014-0078-0131 (explaining that "[i]n 2012, upon NOAA's request, BSEE required that Shell shorten its drilling season to end on September 23," and that, "[s]ince this practice has already been employed during previous Exploration Plan approval processes, it should be considered as an alternative in the leasing process").

example, if a spill occurred on October 31st, drilling of a relief well would not be expected to begin until mid-December. Weather conditions during this time of the year in the Chukchi Sea could make drilling impossible.

The DSSEIS recognizes the harsh and inhospitable conditions that prevail in the Chukchi Sea at this time of year. "Sea ice generally begins forming in late September or early October, covering most of the Leased Area by mid-November or the beginning of December." DSSEIS at 50.[68] The DSSEIS also recognizes that these conditions could make it harder to complete a relief well, stating that "an operator's ability to complete a relief well during winter months could be compromised by severe weather and cold, ice, darkness, and other factors." DSSEIS at 429.[69] Yet it does not take the next, logically necessary, step of considering what effect these conditions would have on the size of a VLOS. Instead, the scenario anticipates only four days of weather downtime in the entire relief operation. DSSEIS at 421, table 4-49.

If the weather conditions prevent the completion of a relief well, the spill will not be controlled, and the well would continue its spill until the next open water season. If a relief well could not be completed until 39 days after the next open-water season began on July 15th, then the spill would not stop until August 23rd of the following year. Extrapolating from the figures

[68] NOAA modeled the likelihood of freezeup occurring at different times in the Chukchi Sea in 2012, projecting "a 1 in 3 chance of freeze-up at the site by October 28; a 50-50 chance of freeze-up in the November 8 to 12 timeframe; and a 7 in 10 chance freeze-up by November 22." U.S. Dep't of the Interior, Review of Shell's 2012 Alaska Offshore Oil and Gas Exploration Program 28 (2013). That year, freeze-up occurred on November 1st. *Id.*

[69] The DSSEIS also recognizes that "a large oil spill occurring during the Arctic winter would likely result in more severe impacts to air quality conditions when compared to summer conditions." DSSEIS at 187-88.

included in the DSSEIS, such a spill could result in the discharge of more than 5.2 million barrels of oil—larger than the Deepwater Horizon spill.[70]

B. Shell's Troubled 2012 Drilling Season Evidences the Dangers of Late-Season Operations in the Arctic.

Moreover, one need not merely hypothesize about the problems that would be encountered. Shell Oil's trouble-filled 2012 drilling season amply demonstrates how unrealistically optimistic BOEM's operating assumption is. As the Department of the Interior summarized it, Shell "experienced major problems with its 2012 program . . . . Shell's difficulties have raised serious questions regarding its ability to operate safely and responsibly in the challenging and unpredictable conditions offshore Alaska."[71]

Two incidents are particularly relevant. First, on September 9, 2012, Shell had to suspend drilling at the Burger A drilling site in the Chukchi Sea for two weeks to allow a large ice floe to pass the site.[72] As the Department of Interior review of Shell's 2012 drilling season put it, this incident "highlights the inherently unpredictable nature of working in the Arctic."[73] If ice can cause a two-week delay in drilling in September, it is plainly unreasonable to plan for only four days of weather downtime for drilling that could occur in December and January, when conditions will be much worse.

[70] This analysis assumes that the rate of decline of the oil discharge per day remains at a steady 60 barrels per day (as it is between days 73 and 74 of the model results presented in table 4-48). Given that the model shows that the rate of decline is slowing, this estimate is therefore conservative.

[71] U.S. Dep't of the Interior, Review of Shell's 2012 Alaska Offshore Oil and Gas Exploration Program 1 (2013).

[72] U.S. Dep't of the Interior, Review of Shell's 2012 Alaska Offshore Oil and Gas Exploration Program 22-23 (2013).

[73] *Id.* at 23. In summing up the 2012 drilling season, Interior concluded that "[i]n submissions to DOI, Shell consistently underestimated the length of time required to complete each step of its drilling operations. The timelines provided by Shell proved to be unrealistic and did not account for complications and delays that should be budgeted for when operating in the Arctic." *Id.*

Second, one of Shell's drilling rigs, the Kulluk, ran aground in stormy seas in December 2012.[74] This incident occurred far south of the Chukchi Sea, in the Gulf of Alaska. If conditions in the Gulf of Alaska are severe enough in December for a drilling rig to break free of its tow ship and run aground, then surely it is unreasonable to base the VLOS analysis on the assumption that a drilling rig can be brought into position much farther north, in the Chukchi Sea, to begin drilling a relief well in mid-December.

C. The DSSEIS Does not Incorporate a Key Lesson of the Deepwater Horizon Disaster: that Relief Operations Can Take much Longer than Expected.

For 87 days, from April 20, 2010 until July 15, 2010, the Macondo well continuously spilled oil into the waters of the Gulf of Mexico, totaling 4.9 million barrels. As part of the response effort, the drilling of two relief wells started on May 2 and May 16 respectively. Even though two drilling rigs were already near at hand, it still took an additional 61 days from the commencement of the drilling of the relief wells for BP to able to stop oil pouring into the Gulf. Furthermore, it was not until September 19, 2010—that is 153 days after the initial triggering "event"—that the well was declared "effectively dead" posing no further threat to the Gulf. Although the DSSEIS assumes improved operations that BOEM and BSEE have mandated since the Deepwater Horizon spill, including the requirement that an operator maintain a second drilling rig nearby, it does not take into account the larger lesson: that when operating in extreme environments, unexpected impediments can—and do—arise.

BOEM's "reasonable and conservative" estimated time required to stop the uncontrolled oil discharge to the Chukchi Sea is actually unrealistic and unreasonable. The Deepwater Horizon disaster showed that real-time response for a large blowout in a well takes more time

[74] *Id.* at 29.

and effort than predicted and the DSSEIS does not consider the hostile Arctic conditions during winter season.

IV. Conclusion

The DSSEIS properly takes into account the possibility of a VLOS in the Chukchi Sea. Although it devotes considerable space to this analysis, the DSSEIS still contains significant gaps. In particular, it is based on an unrealistically low estimate of the maximum spill size, it assumes that dispersants will be an effective oil spill response tool when the evidence does not support that conclusion, and it fails to consider some of the harmful effects of dispersants on wildlife and on the indigenous communities who depend on that wildlife.

Thank you for your consideration of these comments. We welcome the opportunity to discuss this important matter with you at any time. Please direct follow up communications to Shaun Goho, 617-496-5692 (sgoho@law.harvard.edu), or Wendy Jacobs, 617-496-3368 (wjacobs@law.harvard.edu).

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OFFSHORE DRILLING IMPACTS:

STRATEGIES FOR IMPROVING AND COORDINATING ACCESS TO INFORMATION

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The Emmett Environmental Law and Policy Clinic at Harvard Law School is directed by Wendy B. Jacobs and is dedicated to addressing major environmental issues in the United States and abroad and to providing its students an opportunity to do meaningful, hands-on environmental legal and policy work. Students and clinic staff work on issues such as climate change, pollution reduction, water protection, and smart growth.

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EXECUTIVE SUMMARY

This paper recommends mechanisms for facilitating public access to, and intra- and inter-agency sharing of, information from companies engaged in offshore drilling. Multiple federal agencies require companies participating in offshore drilling to submit what is cumulatively a significant amount of information about their operations. Although much of this material is relevant to evaluating and minimizing safety and environmental risks, the information is not readily accessible by the public or routinely shared among the various interested agencies. Limited access to information impairs the ability of stakeholders (such as host communities, investors, regulators, advocacy groups, academics, and members of the general public) to efficiently and effectively evaluate and influence the significant safety and environmental impacts of offshore drilling.

For this project, the Clinic focused specifically on the accessibility of information collected by the Department of the Interior's ("DOI") Bureau of Safety and Environmental Enforcement ("BSEE") due to BSEE's central role in overseeing offshore safety and environmental protection. Despite the creation of BSEE and adoption of the Safety and Environmental Management System ("SEMS") regulations in the wake of the Deepwater Horizon spill, stakeholders still lack sufficient access to information. Although BSEE makes some information available through its website, much important information that the agency collects regarding safety and environmental issues remains unavailable to the public and is not shared effectively with other agencies. This paper identifies obstacles to public and agency access to the information reported to BSEE under its regulations (30 C.F.R. Part 250, or the "Regulations") and offers concrete recommendations to address these problems.[1] These suggestions include steps that can be taken in the near-term, *e.g.*, issuing guidance and actions that require inter-agency coordination over a longer time frame, *e.g.*, developing a centralized reporting system that aggregates inforamtion about off-shore drilling-related activities in a searchable and accessible format.

The obstacles to information access include the following:

- **Unnecessarily Restricted Public Access to Information Essential to Evaluating Safety and Environmental Risks**

  The Regulations allow public access to much of the information submitted on BSEE forms

1 DOI's Bureau of Ocean Energy Management ("BOEM") collects information from offshore drillers under regulations that similarly hamper access to information (30 C.F.R. Part 550). Thus, although this paper focuses on BSEE, many of its recommendations are equally applicable to BOEM.

(§ 250.197(a)), but the forms cover only a portion of the information submitted to, and relied upon by, BSEE in considering a company's safety and environmental impacts. Information that is not reported on a BSEE form and not specifically exempt from public disclosure should be accessible to the public, but the time and effort it takes to access such information frustrates meaningful public oversight of safety and environmental impacts. Moreover, such access may be subject to BSEE determinations of "necessity," further shielding from public review information relevant to assessing safety and environmental risks.

Although BSEE has developed an online Data Center, many documents relevant to evaluating the safety and environmental performance of offshore operators are not available through this system. The Clinic therefore requested samples of such material through informal communications with BSEE and through formal Freedom of Information Act ("FOIA") requests. An initial call to BSEE requesting copies of contingency plans for hydrogen sulfide ("H_2S") releases, which can be fatal to humans and marine species, resulted in referrals to nine different points of contact within BSEE and DOI's Bureau of Ocean Energy Management ("BOEM") over a six week period. At the end of this time, BSEE informed the Clinic that the plans were not "releasable" under FOIA. In response to a subsequent FOIA request, the Clinic received copies of several H_2S contingency plans from BSEE, but the regional officers differed in their responses to the request and the total response time was more than four months. The Clinic's FOIA request for SEMS audit reports and Corrective Action Plans ("CAPs") triggered a requirement for BSEE to consult with the companies that submitted the reports and, after more than three months, resulted in a production of documents that were so heavily redacted as to be meaningless. These experiences demonstrate interpretive and logistical roadblocks to the public's access to information that can be reduced.

- **BSEE's Regulations Require Collaboration Among Agencies But Do Not Mandate Information-Sharing**

  Despite BSEE's mandate, under the Outer Continental Shelf Lands Act (43 U.S.C. § 1334(a)) and the Regulations (§ 250.106(d)), to "cooperate" and "cooperate and consult" with relevant Federal agencies in enforcing safety and environmental laws and regulating lease operations, the Regulations contain only two specific examples of intergovernmental collaboration, both involving cooperation between BSEE and BOEM, another division within DOI. No provision within the Regulations explicitly provides for the transfer of information from BSEE to the Environmental Protection Agency ("EPA"), United States Coast Guard ("USGS"), National Oceanic and Atmospheric Administration ("NOAA"), or any other federal agency with jurisdiction over aspects of offshore drilling. BSEE relies on memoranda of understanding and agreement ("MOUs/MOAs") to meet its obligation to facilitate intergovernmental collaboration.

However, existing interagency agreements fail to provide seamless access to information reported by offshore drillers. The agreements often involve: (i) participants from only a subset of agencies involved in the oversight of offshore drilling; (ii) narrow topical coverage; (iii) lack of clear benchmarks to assess the success of collaborations; and, (iv) vague language.

To address these deficiencies in information access, the Clinic recommends several mechanisms to (i) facilitate meaningful public access to safety and environmental information BSEE collects from offshore drillers, and (ii) enhance intra- and inter-agency sharing of information about offshore drilling. These recommendations, summarized below, are consistent with the executive directive to federal agencies to "adopt a presumption in favor of disclosure" and "take affirmative steps to make information public."[2] In particular, BSEE should:

- Issue guidance confirming that BSEE will apply a presumption of public access to, and need for, non-confidential information relevant to safety and environmental impacts of offshore drilling. More particularly, such guidance should clarify that: (i) the presumption of public access applies to all lease and permit data and information that BSEE receives outside of a BSEE form, except as specifically provided otherwise in paragraph (b) of Section 250.197; and (ii) the intent of paragraph (c) of Section 250.197 is to expand public access to otherwise proprietary geophysical and geological data.
- Require reporting entities to provide a copy of submitted reports in a format immediately ready for public distribution (i.e., with any information claimed to be protected redacted).
- Increase the scope of, and accessibility to, material posted on its public website.
- Revise its reporting forms to provide a clear right of immediate access to a greater portion of the information submitted to BSEE.
- Create a centralized reporting system for offshore drilling-related activities to facilitate aggregation of information collected by all of the agencies with jurisdiction in a single and searchable system available to the public and all interested regulators. Shared access to streamlined information within and among agencies would benefit not only agencies with specific authority over offshore drilling, but also agencies such as the Securities Exchange Commission

2 Memorandum from President Obama to Heads of Exec. Dept's & Agencies, Re: Freedom of Information Act (Jan. 23, 2009), *available at* http://perma.cc/7CQ8-ZUPL (last visited December 17, 2014).

("SEC"), whose responsibilities encompass consideration of the safety and environmental impacts of offshore drilling. The SEC should be included in efforts to improve oversight of offshore drilling, particularly as relates to information disclosure and access.

These recommendations build on BSEE's existing data collection processes and would not increase the amount or type of information collected by BSEE. Rather, the recommendations would streamline reporting and public access to information without creating additional substantive requirements for the regulated community. These proposals, and the obstacles to information access that they address, are discussed in greater detail below, followed by sample documents that BSEE could utilize in implementing the recommendations.

BACKGROUND

The importance of access to information about offshore drilling operations was highlighted by the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling ("National Commission") in the wake of the 2010 explosion on the Deepwater Horizon drilling rig and subsequent blowout of the Macondo well on the floor of the Gulf of Mexico. The Commission found that the disaster was preventable because it was the result, in large part, of a systemic breakdown of the environmental review process and a corporate culture that did not place a premium on safety or environmental performance.[3] Improved oversight, including better collection of and public access to information, is particularly important with respect to any future offshore drilling in sensitive, complex, and controversial locations such as the Arctic.[4]

Successful oversight includes not only the collection and processing of relevant information, but also meaningful and timely access to and review of such material by the public and relevant government

3 National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling: Report to the President, 126-27, 224-25 (2011) [hereinafter National Commission Report to the President].

4 While changes have occurred since the Deepwater Horizon disaster, such as the creation of BSEE and the SEMS program, a recent report from the United States Chemical Safety and Hazard Investigation Board argues that more can, and should, be done to improve the safety of offshore drilling, including via changes to the SEMS program. United States Chemical Safety and Hazard Investigation Board: Investigation Report, Volume 2, Explosion and Fire at the Macondo Well, Report No. 2010-10-I-OS (June 5, 2014), *available at* http://perma.cc/AYW2-7BEZ (last visited December 17, 2014) ("While US offshore regulations have undergone important changes since Macondo, more can be done to ensure a focus on preventing major accident events and to drive continuous safety improvement.")

agencies. Stakeholders with an interest in the safety and environmental impacts of offshore drilling include: host communities; investors; local, state, and federal agencies; advocacy groups; academics; and members of the general public. Our research found that these stakeholders do not have sufficient or meaningful access to safety and environment-related information submitted by industry to the DOI (via BSEE and BOEM). Facilitating access to information is a critical step toward effective oversight of offshore drilling.

A large number of federal agencies participate in the regulation of offshore drilling. Although each agency collects information from industry, there is at present little inter-agency sharing of this information. This fragmentation of access to information hampers the agencies' abilities to perform effective and comprehensive reviews and analyses that could contribute to improved oversight of safety and environmental impacts from offshore drilling. (Relevant agencies include DOI's BSEE and BOEM, EPA, the USCG, the Department of Transportation ("DOT") and NOAA.) Enhanced information sharing among the agencies that oversee or have an interest in offshore drilling would support better informed evaluations and decision making. In addition, there could be cost-savings and efficiencies generated for regulators and the regulated community alike.

ANALYSIS

The Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.) and the Regulations establish a regime under which industry transfers to BSEE significant amounts of information, including material relevant to evaluating safety and environmental impacts of offshore drilling activities. These information submission requirements apply across the life of a project. For instance, operators must submit certain reports for approval by BSEE before altering drilling procedures, thereby providing BSEE with information to assess environmental risks while the underlying operations are still in the planning stages.[5] Operators are also required to provide or make available to BSEE periodic updates as well as event-triggered reports, thus giving BSEE information for continually monitoring compliance through the life of a project.[6] In addition, BSEE may inspect drill sites, with or without

5 *See, e.g.*, 30 C.F.R. §§ 250.286-295 (regarding Deepwater Operations Plans and Conceptual Plans), 250.410-18 (regarding permits to drill wells). BOEM also collects information from operators prior to the commencement of exploration and/or development and production activities. *See, e.g.*, 30 C.F.R. § 550.201 (regarding timing for submitting Exploration Plans, Development and Production Plans, Development Operations Coordination Documents and Conservation Information Documents).

6 *See, e.g.*, 30 C.F.R. §§ 250.187-190 (regarding incident reporting), 250.192 (regarding reporting relating to hurricanes and other natural occurrences), 250.516 (regarding blowout prevention system testing).

prior notice to the operator.[7]

The breadth of information available to and collected by BSEE ranges from general plans to the technical minutia of individual site operations, including, but not limited to: H_2S contingency plans; Blowout Protection procedures; Deepwater Operations Plans; SEMS plans, audited reports and records; equipment design and performance specifications; maintenance test results; maps and schematic drawings of proposed drill sites; geological and geophysical data; and incident reports related to events such as workplace injuries and evacuations. Despite the breadth of this information available to BSEE, public access to the information is limited.

1. Unnecessarily Restricted Public Access to Information Essential to Evaluating Safety and Environmental Risks

A 2009 Presidential Memorandum directs federal agencies to "take affirmative steps to make information public" and adopt "a presumption of disclosure" in processing requests for information under FOIA.[8] In this vein, BSEE's objectives, articulated in an agency manual, include "mak[ing] information available to the public even before a request is made" and "[a]dminister[ing] the FOIA with a clear presumption in favor of disclosure."[9] However, these goals are not reflected in BSEE's Regulations or in its actions, particularly as they relate to information relevant to safety and environmental concerns. In particular, the Regulations themselves lack a clear statement adopting a presumption in favor of disclosure and contain confusing language regarding the public availability of information used by BSEE to "promote operational safety" or "protect the environment." In addition, as discussed below, the agency makes subjective decisions as to when and to whom certain information should be available.

A. Restrictions Arising from Unclear Regulations

The catchall provision governing public access to information reported to BSEE, 30 C.F.R. § 250.197,[10] neither definitively gives the public access to information BSEE uses to assess threats to safety and the

7 *See, e.g.*, 30 C.F.R. §§ 250.130-132, 301 (regarding inspections).

8 Memorandum from President Obama, *supra* note 2.

9 DOI, *BSEE Manual*, Version No. 001, Administrative Series, Part 383, Chapter 15 (Nov. 1, 2011), *available at* http://perma.cc/P5B2-FZDH (last visited December 17, 2014).

10 BSEE's authority to ask reporting entities for additional copies of reports "for public information" is subject to the exemptions from public disclosure articulated in Section 250.197. *See* 30 C.F.R. § 250.186(b).

environment nor does it provide for a presumption of public access. Section 250.197 is divided into three parts:

> "Paragraphs (a) and (b)…describe what data and information will be made available to the public without the consent of the lessee, under what circumstances, and in what time period. Paragraph (c)… describes what data and information will be made available for limited inspection without the consent of the lessee, and under what circumstances."

Paragraph (a) of Section 250.197 provides that information submitted on BSEE forms will be available to the public upon submission, with the exception of enumerated entries on seven forms that may be withheld for a specified period of time. While paragraph (a) creates a mechanism by which most of the information submitted on BSEE forms is to be immediately made available to the public, it covers only a portion of the information that BSEE receives from offshore operators and relies upon in its analysis and decision-making. For instance, SEMS audit results and resulting Corrective Action Plans ("CAPs") are not reported on BSEE forms. Thus, access to BSEE forms does not provide sufficient information to evaluate safety and environmental risks posed by offshore drilling.

Paragraph (b) of Section 250.197 addresses public access to lease and permit data and information that is submitted to BSEE in a format other than on a BSEE form. Such information is accessible according to a table identifying nine scenarios, each of which stipulates specific categories of information BSEE may release and the amount of time BSEE may delay access to the information. With respect to the scope of information at issue, in all but two of the scenarios the enumerated information that BSEE will release is limited to geophysical and geological data or information.[11] Non-geophysical and geological data outside of a BSEE form, such as the information in SEMS audit reports and CAPs, is not declared by the Regulations to be within the scope of material available to the public. However, a blanket withholding of documents that is not tied to a specific FOIA exemption would be a violation of the statute.[12] Any limitation on public access to information should

11 The other categories of information addressed in paragraph (b) are: (i) "[d]escriptions of downhole locations, operations, and equipment" related to well operations; and (ii) any data or information obtained from beneath unleased land as a result of a well deviation that has not been approved by BSEE. 30 C.F.R. § 250.197(b)(7), (8).

12 *See, e.g.*, *Dep't of Interior v. Klamath Water Users Protective Ass'n*, 532 U.S. 1, 7-8 (2001) ("Upon request, FOIA mandates disclosure of records held by a federal agency . . . unless the documents fall within enumerated exemptions . . . . '[T]hese limited exemptions do not obscure the basic policy that disclosure, not secrecy, is the dominant objective of the Act,' . . . '[c]onsistent with the Act's goal of broad disclosure, these exemptions have been consistently given a narrow compass.'" (internal citations omitted); *United States Dep't of Justice v. Julian*, 486 U.S. 1, 8 (1988) ("'[T]he mandate of the FOIA calls for broad disclosure of Government records,' and for this reason we have consistently stated that FOIA exemptions are to be narrowly construed.") (internal

apply only to material that BSEE determines is subject to a FOIA exemption from disclosure, such as: (i) the rarely used exemption for geological and geophysical information and data, including maps, concerning wells; or (ii) the protection for trademarks and confidential business information.

Even when information should be released under paragraph (b), in some scenarios the Regulations allow BSEE to curtail public access to information for two, ten, or even fifty years after submission or issuance of a permit.[13] In other instances, the timing of access is even less clear as the availability of some information related to safety and environmental protection is contingent on determinations by BSEE as to whether public access is "necessary."[14] The Regulations, however, do not contain criteria for determining whether public access to information is "necessary."

Finally, paragraph (c) of Section 250.197 provides limited public access to "G&G data and information" that BSEE uses to "[p]romote operational safety" or "[p]rotect the environment." Such information is only available for "limited inspection… by persons with a direct interest in related BSEE decisions and issues in specific geographic areas, and who agree in writing" to keep the information reviewed confidential. The Regulations neither define "G&G data and information" nor provide guidance as to what constitutes a "direct interest" in a BSEE decision or issue. The regulatory history of paragraph (c) suggests that the provision is intended to relate to otherwise proprietary geological and geophysical data that is relevant to parties who are "directly affected by [BSEE] decisions regarding units, reservoirs, operations, environmental protection, field determinations, and royalty relief."[15] However, in the absence of a clear mandate establishing a public disclosure default, this provision could be misinterpreted to restrict public access to non-protected information used by BSEE to protect safety and the environment.

These types of delays and absence of standards governing decisions by BSEE personnel as to whether there is a "need" for or "direct interest" in information that warrants disclosure diminish the value of access provided by Section 250.197 and frustrate meaningful public oversight of safety and

citations omitted).

13 *See, e.g.*, 30 C.F.R. § 250.197(b)(6) (making geological data and analyzed geological information for leases in effect beyond the primary term specified in the lease available two years after the required submittal date); *id.* at § 250.197(b)(4) (making geophysical data, processed geophysical information and interpreted G&G information for leases still in effect available ten years after submission); *id.* at § 250.197(9) (making certain geophysical data available fifty years after BOEM issues a permit).

14 *See, e.g.*, 30 C.F.R. § 250.197(b)(2) (providing that certain information "collected with high-resolution systems . . . to comply with safety or environmental protection requirements" may be released 60 days after BSEE receives the information if a regional supervisor from the division deems it "necessary").

15 67 Fed. Reg. 46942, 46943 (Jul. 17, 2002).

environmental impacts.

B. Restrictions Arising from Logistical Issues

Even when information is required to be accessible by 30 C.F.R. Part 250, there are roadblocks to retrieving it from BSEE. Despite BSEE's creation of an on-line Data Center,[16] information is missing from BSEE's website or difficult to find. For example:

- SEMS audit reports and CAPs, examples of documents relevant to evaluating the safety and environmental performance of offshore operators, do not appear to be included in the Data Center, and some categories of information in the Data Center are available only from a particular BSEE office (e.g., the Gulf of Mexico OCS Region);
- In some instances, documents that must now be filed with BSEE, such as H_2S contingency plans, are part of BOEM's electronic dataset rather than BSEE's.[17] A division of material between BSEE's and BOEM's websites is not, in and of itself, problematic, nor perhaps unexpected given the fact that the two agencies used to be a single entity, but the lack of notice to this effect hinders public access; and
- Even if one knows which agency website to search, reports like H_2S contingency plans are often not available as stand-alone documents, but are included as appendices to other lengthy documents. Without a more refined search tool or index, retrieving information from BSEE's Data Center can be hit-or-miss and time-consuming.

The type of searchable database that aggregates operating information submitted to multiple agencies discussed later in this paper would address these issues. However, such a system would take time to develop, so in the interim we recommend that BSEE expand and improve its online Data Center, *e.g.*, enhancing the aggregation of information and search capabilities, as making material available online avoids the lag in response associated with FOIA requests and the administrative burden such requests place on BSEE. Until the system is upgraded, however, it is essential for the public to be able

16 The BSEE on-line Data Center can be accessed via http://perma.cc/E5T7-N7NL (last visited December 17, 2014).

17 30 C.F.R. § 250.490(f) (requiring H_2S Contingency Plans to be submitted to and approved by BSEE District Managers prior to beginning operations). Prior to October 2011, BSEE and BOEM were a single federal agency under the regulatory umbrella of the Bureau of Ocean Energy Management, Regulation and Enforcement ("BOEMRE"), and H_2S Contingency Plans were submitted to BOEMRE.

to receive material directly from BSEE. To evaluate the ease of access to environment- and safety-related information, the Clinic requested copies of H_2S contingency plans submitted by offshore operators to BSEE, first through a series of informal oral and written communications with BSEE and then through a formal FOIA request. (H_2S contingency plans, which are relevant from a safety and environmental perspective because releases of H_2S can be fatal to humans and marine species, are neither submitted on a BSEE form nor explicitly excluded from public access by the Regulations.)

The Clinic initiated outreach to BSEE on October 24, 2013 by calling BSEE's Gulf Coast OCS Regional Office to request copies of H_2S contingency plans filed pursuant to the Regulations within the last two years. BSEE representatives referred the Clinic to different specialists within their offices and BOEM, at times transferring the caller to defunct telephone extensions and channeling most written communication to generic email accounts such as GulfPublicInfo@bsee.gov and Foiaofficegulfofmexicoocsregion@boem.gov. In all, the Clinic requested the H_2S contingency plans in communications with nine individuals as well as through the aforementioned email accounts to no avail.

On November 6, a representative from BSEE's Gulf Coast OCS Regional Office informed the Clinic that the requested H_2S contingency "[p]lans are not releasable even under FOIA."[18] When asked to specify the FOIA exemption(s) being invoked, the BSEE representative referred the Clinic to BOEM's FOIA request email account without answering the question.[19] BOEM responded to the Clinic inquiry by suggesting that it submit a FOIA request.[20]

Because BSEE referred the Clinic to BOEM, the Clinic filed FOIA requests for H_2S contingency plans with both agencies, asking for copies of plans filed with either agency, or its predecessor.[21] BOEM responded that the documents requested "are not located in BOEM."[22] The regional offices of BSEE each responded somewhat differently to the identical FOIA request: (i) the Alaska region referred

18 Email from Roberta S. McMahon, Government Information Specialist (FOIA), Gulf of Mexico OCS Region, BSEE, to Daniel Becker, student, Emmett Environmental Law and Policy Clinic (EELPC), Harvard Law School (Nov. 6, 2013) (on file with author).

19 Email from Roberta S. McMahon, Government Information Specialist (FOIA), Gulf of Mexico OCS Region, BSEE, to Daniel Becker, student, EELPC, Harvard Law School (Nov. 8, 2013) (on file with author).

20 Email from Jeremy Williams, BOEM, to Daniel Becker, student, EELPC, Harvard Law School (Dec. 2, 2013) (on file with author).

21 This time, the request focused on plans filed more than two years ago to avoid any risk of the request being denied based on opportunities for delayed disclosure in 30 C.F.R. § 250.197(b).

22 Letter from Steven K. Waddell, Chief, FOIA/Records Office, Gulf of Mexico OCS Region, BOEM, to Jean Tanis, student, EELPC, Harvard Law School (Feb. 26. 2014) (on file with author).

the Clinic to an H_2S contingency plan available on BOEM's website; (ii) the Pacific Region forwarded copies of several H_2S contingency plans; and (iii) the Gulf of Mexico Region claimed that the request for H_2S contingency plans sought commercial or financial information that triggered a requirement for BSEE to consult with the submitter prior to responding to the FOIA request. In total, the response from BSEE took over four months.[23]

The Clinic filed a separate FOIA request with BSEE asking for specific SEMS audit reports, CAPs, and completed BSEE Forms 0131 (on which operators submit Performance Measures Data). BSEE acknowledged receipt of the FOIA request and, in response to an inquiry two months later, informed the Clinic that the request was still in the FOIA office queue for processing and, because BSEE determined that the requested documents included commercial confidential information, the agency had notified the submitters of the reports of the request and was awaiting their response.[24] The documents that BSEE sent the Clinic approximately six weeks later were so heavily redacted that they are largely meaningless. In redacting information, BSEE broadly invoked exemptions from FOIA relating to "trade secrets and commercial or financial information, obtained from a person, which is privileged or confidential" and "personnel and medical files and similar files, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy."[25]

These experiences demonstrate unnecessary roadblocks to the public's timely access to information submitted to BSEE. The delays the Clinic has experienced in receiving information exceed the typical 30 to 90-day comment periods on draft regulations, illustrating the practical impact on stakeholders using FOIA requests to enhance their ability to contribute to discussions relevant to ensuring safe and environmentally sound off-shore drilling. Responses from BSEE are further slowed by the need to go back-and-forth with industry regarding material claimed to be business confidential. If BSEE required industry to submit redacted versions of reports, such as SEMS audit reports, along with original submissions, those redacted materials could be promptly forwarded as a placeholder in

23 Letter from Brendan Henry, Government Information Specialist, FOIA, Alaska OCS Region, BSEE, to Jean Tanis, student, EELPC, Harvard Law School (Mar. 3, 2014) (on file with author); Letter from Janice R. Hall, FOIA Officer, Pacific OCS Region, BSEE, to Jean Tanis, student, EELPC Harvard Law School (Mar. 25, 2014) (on file with author); Letter from Karen M. Miller, FOIA Officer, Gulf of Mexico OCS Region, BSEE, to Jean Tanis, student, EELPC, Harvard Law School (June 17, 2014) (on file with author).

24 Email from Dorothy Tinker, BSEE FOIA Office, to Aladdine Joroff, Staff Attorney, EELPC, Harvard Law School (May 1, 2014) (on file with author).

25 Letter from Dorothy Tinker, BSEE FOIA Office, to Aladdine Joroff, Staff Attorney, EELPC, Harvard Law School (June 12, 2014) (on file with author).

response to public inquiries while BSEE prepares a formal response to FOIA requests. The quality of responses is further impaired by inappropriately broad applications of FOIA exemptions.

2. BSEE's Regulations Require Collaboration Among Agencies But Do Not Mandate Information-Sharing

Numerous federal agencies play a role in offshore drilling oversight. Entities with a significant role include BSEE, BOEM, EPA, and the USCG. Other agencies also play a role, albeit a more limited one, including DOT and NOAA. While the stated goals of many of these agencies include transparency and improved information management to ensure environmental protection,[26] the accessibility of the vast amounts of information reported to these and other agencies remains limited, not only to the public but also within and between agencies. For instance, BSEE's regulations include only two examples of intergovernmental collaboration, both of which relate to cooperation between BSEE and BOEM, its sister division within DOI.[27] No provision within the Regulations explicitly provides for sharing information with EPA, USCG, NOAA or other agencies despite the directive to BSEE, both in the Outer Continental Shelf Lands Act and the Regulations, to cooperate and consult with "relevant federal agencies."

BSEE relies on interagency agreements, e.g., MOUs and MOAs, to facilitate intergovernmental collaboration and information sharing. Examples include: (i) a 2012 MOU with the USCG regarding the Outer Continental Shelf and a subsequent MOA regarding SEMS and Safety Management, both of which include information sharing provisions;[28] and (ii) an interagency agreement with the Bureau of

26 *See, e.g.*, BSEE, *BSEE FY 2012-2015 Strategic Goals at a Glance*, http://perma.cc/BFG4-XG8J (last visited December 17, 2014) (including in BSEE's strategic goals "[t]echnology and information management investment: revamp data systems, knowledge management, and innovation."); EPA, *EPA's Themes – Meeting the Challenge Ahead*, http://perma.cc/EMX9-VT5J (last visited December 17, 2014) ("Integrating efforts with a new commitment to innovation, the high-level use of data and information, partnerships, incentives, new and expanded constituencies, and environmental education will build momentum.").

27 30 C.F.R. §§ 250.135, 250.136.

28 *See, e.g.*, Memorandum of Understanding between BSEE and USCG re: Building a Partnership to Improve Safety and Environmental Protection, at § F (Nov. 27, 2012) (requiring the participating agencies to "promote electronic information sharing," "endeavor to synchronize information" and "exchange or otherwise make available . . . graphical representations depicting the geographical boundaries of each agency's regional offices and commands"); Memorandum of Agreement between BSEE and USCG re: Safety and Environmental Management Systems and Safety Management Systems (BSEE/USCG MOA: OCS-07), at § C.5 (April 30, 2013) (providing for sharing of information related to the agencies respective "safety management efforts," including "[a]ny significant finding relevant to OCS safety and environmental management"). Both of these documents, as well as other examples of collaboration between BSEE and USCG, are *available at* BSEE, *Cooperative and Interagency Agreements*, http://perma.cc/X8JY-28E9 (last visited December 17, 2014).

Transportation Statistics to develop a voluntary confidential near-miss reporting system for use on the Outer Continental Shelf.[29]

Such interagency agreements for sharing information are hampered by limited participation, narrow coverage, lack of benchmarks, and vague language. Existing interagency agreements are often between only two agencies at a time and/or address discrete issues. Achieving seamless information sharing, however, requires a comprehensive solution that accounts for all of the information reported to all agencies involved in offshore drilling oversight, as well as making all of that information accessible to other interested parties.[30] By their very nature, bilateral agreements cannot achieve these goals. Progress is further hampered by agreements that do not clearly state the obligations they impose or provide mechanisms for determining whether goals are being met. For instance, although BSEE's MOA with the USCG regarding SEMS programs directs the agencies to share information about their "safety management efforts," and gives two examples of specific information to be shared, including "[a]ny significant finding relevant to OCS safety and environmental management," the information sharing obligations are still subject to subjective agency decision-making as to which information is "significant" enough to share. Agreements with provisions that outline specific requirements and mandate evaluations of the collaborations' effectiveness are likely to produce more effective results. (The proposed MOA included with this paper includes examples of provisions that address these points.)

Existing inefficiencies in information sharing can be illustrated by the reports that are required in the event of an "incident" related to offshore drilling activities. The USCG, EPA, and BSEE each require a report that asks for similar, if not duplicative, and potentially complementary information in the event of an incident related to offshore drilling activities.[31] However, these agencies do not have formal agreements or mechanisms with each other to coordinate or streamline the information collected upon the occurrence of an incident. Formally coordinating sharing of the information in these reports would benefit the public, industry, and the agencies themselves by ensuring that the reported information is consolidated. This in turn would enable the publication of integrated information through a single source that would be easy to find and access by interested agencies and other parties.

29 U.S. Dept. of Transportation, *BTS and BSEE to Develop Confidential Near-Miss Reporting System*, http://perma.cc/883F-W6MC (last visited December 17, 2014).

30 *See generally*, U.S. Government Accountability Office (GAO), GAO-14-220, Managing for Results: Implementation Approaches Used to Enhance Collaboration in Interagency Groups (2014) (identifying as key practices in collaborative interagency mechanisms, among other factors, tools to monitor, evaluate and report on results and inclusion of all relevant participants).

31 *See, e.g.*, USCG Form CG-2692 (Report of Marine Casualty), 40 C.F.R. § 112.4(7), 30 C.F.R. § 250.189(h).

One such interested agency that is often missing from the discussion of oversight of offshore drilling is the Securities and Exchange Commission ("SEC"). Although the SEC does not have specific authority to regulate offshore drilling activities, it should be included in efforts to improve offshore drilling oversight, particularly as relates to information disclosure. The SEC regulates all publicly-traded companies,[32] including those engaged in offshore drilling activities. A basic principle of the SEC's reporting requirements is that companies must report any information that is "material" to a reasonable investor in deciding whether to buy, sell or hold a company's securities. While the definition of what is "material" for SEC purposes is itself a complex and debated issue, one can reasonably assume that much of the information reported under the offshore drilling regulatory scheme concerning safety, environmental protection and incidents, especially when considered in the aggregate, amounts to what many investors would consider material information.

The concept of providing the SEC better access to information relating to environmental impacts is not new. In a 2004 study, the U.S. Government Accountability Office ("GAO") recommended that the SEC improve the tracking and transparency of company filings, particularly in the realm of environmental disclosures.[33] The SEC concurred with the GAO's findings.[34] Providing the SEC with access to information reported by offshore drillers to other federal agencies would be consistent with the GAO's recommendations and with the SEC's previous efforts to improve its consideration of environmental issues. For instance, in 1990 the SEC and EPA had an agreement under which EPA provided the SEC with quarterly enforcement-related data.[35] According to the SEC, the value of this attempt at information sharing was limited due, at least in part, to the SEC's inability to analyze the great volume of complex data it received from EPA.[36] This type of problem could be addressed by integrating the SEC's data needs into information collection processes so that material is submitted and shared in a format that matches the SEC's role as the securities market regulator (e.g., ensuring that information on a spill or chemical storage is linked to the level of corporate identification that the SEC tracks).

32 Securities Act of 1933, 15 U.S.C. § 77a *et seq.*; Securities Exchange Act of 1934, 15 U.S.C. § 78a *et seq.*

33 GAO, GAO-04-808, Environmental Disclosure: SEC Should Explore Ways to Improve Tracking and Transparency of Information, at 1 (Jul. 2004), *available at* http://perma.cc/JD7A-N763 (last visited December 17, 2014) ("Environmental risks and liabilities are among the conditions that, if undisclosed, could impair the public's ability to make sound investment decisions").

34 *Id.*

35 *Id.* at 28.

36 *Id.* For example, EPA provided facility-specific information without identifying the facility owner, but the SEC required the ownership information in order to make use of the data.

RECOMMENDATIONS

1. Issue Guidance Clarifying that BSEE Adopts a Presumption in Favor of Disclosure

Although the Regulations are arguably consistent with a public disclosure default, they do not clearly incorporate such a presumption and at times contain confusing language that leads to inappropriate limitations on public access to non-confidential information submitted to BSEE. To address these shortcomings, BSEE should issue guidance for internal and external purposes that confirms and clarifies how it intends to meet its, and the administration's, goals of making information available to the public and responding to FOIA requests with a presumption in favor of disclosure.

Examples of clarifications and directions that should be provided in such guidance include:

- Clarify that BSEE (i) interprets its Regulations as providing a presumption of public access to information related to safety and the environment, and (ii) presumes that disclosure of such information is "necessary" unless demonstrated otherwise (i.e., BSEE employees should assume a rebuttable presumption of public need for information submitted to BSEE);
- Confirm that, pursuant to paragraph (b) of Section 250.197, BSEE will release all lease and permit data and information not on BSEE forms except as specifically enumerated in that paragraph;
- Confirm that the purpose of paragraph (c) of Section 250.197 is to expand public access to otherwise proprietary geophysical and geological data;
- Direct BSEE employees to consistently exercise the agency's authority to request that reporting entities provide an additional "public-ready" copy of submitted reports for public information, with information for which a protection is asserted redacted (30 C.F.R. § 250.186(b)); and
- Direct BSEE employees to increase the scope and magnitude of discretionary releases of non-confidential material on BSEE.gov and other appropriate electronic sources.

These suggestions are consistent with federal guidance that directs agencies to "exercise their discretion to make a broad range of records available beyond the minimum required by [FOIA]," and

highlights their ability to make discretionary disclosures of information, even if it falls under a FOIA exemption, if not otherwise prohibited.[37]

2. Facilitate Public Access to Information through 30 C.F.R. Part 250 by Amending BSEE Forms

BSEE's Regulations are supposed to be interpreted so as to make information the agency collects available to the public unless specifically exempted from disclosure. As written, however, the Regulations provide for expedited access to only a portion of the information submitted to BSEE, namely, data and information submitted on BSEE forms is supposed to be publicly available upon submission, subject to enumerated exceptions. Notably, the forms represent only a subset of the information collected and used by BSEE in assessing safety and environmental impacts. BSEE should expand the scope of material subject to the immediate public disclosure requirement in paragraph (a) of Section 250.197 by instructing operators to attach additional safety and environment-related information to existing BSEE forms. Given the growing use of electronic submissions, attaching additional documents to a form would not be burdensome.

Where electronic submissions are not available or the norm, referenced documents could be deemed incorporated by the submitter's signature if not physically or electronically attached to the relevant BSEE form. Although amending BSEE forms in this manner is not required for public access to information currently submitted in other formats, it would be a means of implementing the directive, recommended above, to expand the scope of material that should be promptly made available to the public, including via BSEE's public website.

Examples of BSEE forms that should be modified include Well Activity Reports (BSEE-0133), Applications for Permits to Modify (BSEE-0124), and End of Operations Reports (BSEE-0125). For instance, Well Activity Reports, which operators must submit weekly or daily depending on where they are drilling,[38] should be amended by adding a line item asking operators to list information related to safety and environmental protection otherwise submitted to BSEE prior to or in the relevant reporting period. With respect to daily or weekly reports, operators would only need to attach new information in the first applicable reporting period; information would not need to be re-submitted

37 U.S. Dep't of Justice, Freedom of Information Act Guide (2004), Proactive Disclosure at 11-12, *available at* http://perma.cc/BJ8B-9ZUF, Discretionary Disclosure and Waiver at 686, *available at* http://perma.cc/7TA6-5GK6 (last visited December 17, 2014).

38 30 C.F.R. § 25.468 (requiring operators drilling in the (i) Gulf of Mexico OCS Region or (ii) Pacific or Alaska OCS Regions to submit Well Activity Reports on a weekly and daily basis respectively).

on a weekly or daily basis. This direction would be accompanied by a non-inclusive list of responsive information, which would then be attached to or incorporated as part of form BSEE-0133 itself. An annotated copy of form BSEE-0133 that reflects the proposed new line item is included here as Attachment A.

Amending BSEE forms in this manner would not increase the amount or type of information collected by BSEE, but would merely change the submission process and, potentially, the categories of information readily available for public access. Because there would be no "substantive or material modification" to BSEE's previously-approved collection of information, the agency could proceed by issuing a Notice to Lessees ("NTL") without triggering obligations under the Paperwork Reduction Act.[39] BSEE issues NTLs as guidance documents to "clarify, supplement, or provide more detail" about requirements in the Regulations and to "outline what [reporters] must provide as required information in [their] various submissions."[40] Historically, BSEE has determined that many of its NTLs, including ones that designate the format and timing of submissions of information, do not impose additional information collection requirements subject to the Paperwork Reduction Act.[41]

3. Develop a Searchable Online Database that Aggregates Operator-Submitted Information

The information collected by the numerous federal agencies that play a role in the oversight of offshore drilling is fragmented, hindering efficient information management and effective analysis of the impacts of offshore drilling. A searchable, shared database would reduce reporting burdens on industry and improve oversight. Access to shared data can lead to more informed and innovative analysis and ideas; as noted in the context of scientific data, "[t]he power of digital information to catalyze progress is limited only by the power of the human mind."[42] Even agencies without specific authority over offshore drilling, such as the SEC, would benefit from greater access to streamlined data relevant to the safety and environmental impacts of offshore drilling. Pursuant to its mandate

39 44 U.S.C. §§ 3501, 3507(h)(3) (providing that, once the Office of Management and Budget ("OMB") has approved a collection of information, an agency may not make a "substantive or material" modification to the collection without OMB approval.).

40 30 C.F.R. § 250.103.

41 *See* http://perma.cc/56NR-ARR4 (listing active BSEE NTLs issued from 1998-2014) (last visited December 17, 2014).

42 Report of the Interagency Working Group on Digital Data to the Committee on Science of the National Science and Technology Council, Harnessing the Power of Digital Data for Science and Society, at 4 (Jan. 2009).

to "cooperate and consult with . . . relevant Federal agencies" in the regulation of offshore oil and gas operations, BSEE should take action to facilitate information sharing within and among agencies with a role or interest in the oversight of offshore drilling.

To address the current deficiencies in agency information sharing, BSEE should reach out to and collaborate with other relevant agencies to establish a centralized electronic reporting system capable of aggregating operator-submitted information in a searchable online database. (This outreach should include the SEC, which should participate with other federal agencies in devising the mechanisms for sharing information so that it can specify its information needs.) The database should aggregate all information submitted by offshore operators that is relevant to safety and environmental performance and be made accessible to all federal regulators and, except for information that is confidential, the general public.[43] BSEE could use a multi-agency MOA to develop such a centralized, electronic system for collecting and processing information from regulated offshore drilling entities. (A sample MOA is included in Attachment B.)

A multi-agency MOA would build on current, often bilateral, information sharing efforts between agencies by expanding the scope of existing agreements and establishing deadlines for facilitating improved information sharing and access. In particular, the signatories to the MOA would:

(i) Compile a list of information reportable by offshore drilling entities, organize such data by searchable parameters,[44] and identify and address any gaps, overlaps or discrepancies in reporting requirements. In compiling this list of information, the agencies should identify which material is confidential and specify that the rest is automatically accessible to the public. Such an exercise would help address ambiguities in BSEE's regulations as to which information it intends to withhold from public access and for how long;

(ii) Develop a computer application that provides a streamlined method by which offshore facilities can submit all required information electronically. This system could include a

43 The Mine Safety and Health Administration ("MSHA") and the Pipeline and Hazardous Material Safety Administration ("PHMSA") maintain searchable online databases that could serve as models. *See* Mine Safety and Health Administration, *Mine Data Retrieval System, available at* http://perma.cc/KA6J-BDEC (last visited December 17, 2014) (containing information gathered from various MSHA systems); Pipeline and Hazardous Material Safety Administration, *Pipeline Operator Information*, *available at* http://perma.cc/KKE4-3YKV (last visited December 17, 2014) (collecting operator information from multiple sources including operator reported and internal PHMSA data).

44 Possible search parameters might include collection agency, date of submission, type of disclosure (voluntary or mandatory), and circumstance of disclosure (periodic or incident based).

graphical user interface that would allow users to enter information for multiple reports simultaneously. The system should also allow facilities to submit confidential information separately. (Figure 1 below presents a conceptualized model for a graphical user interface screen that, while not intended to be a final product, provides an illustration of the idea); and

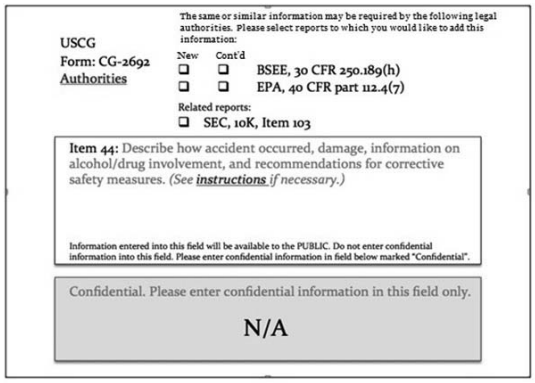

Figure 1: Conceptualized GUI Model

(iii) Create a searchable database that includes all reported information for use by all interested regulators and, with respect to non-confidential information, all other stakeholders and members of the public.

While conceptual and design input from all relevant agencies should be obtained early in the process, the computer application and database could be developed in stages, beginning with a pilot project to test the system and incorporate stakeholder feedback. A possible funding mechanism for the development and maintenance of such a system would be license and permit fees.

Providing regulators immediate access to information collected by other agencies, and alleviating the need for the public to proceed under the often lengthy FOIA process, would improve the ability of regulators and stakeholders alike to monitor and assess the safety and environmental performance

of offshore operators.[45] Such increased and timely access to information is needed to help displace the "culture of complacency" that the National Commission identified in the wake of the Deepwater Horizon tragedy.[46]

Facilitating access to information is a critical step toward effective oversight of offshore drilling and protection of human health and the environment. Much can be done to achieve this goal without creating additional substantive requirements for or burdens on the regulated community, and would represent a significant step by BSEE towards meeting its mandates to proactively make information public and to cooperate and coordinate with other federal agencies in the regulation and oversight of offshore oil and gas operations.

* * *

45 For a discussion of the possible uses of currently-reportable data in monitoring the safety and environmental performance of offshore operators, *see* Wendy B. Jacobs, *Suggested Indicators of Environmentally Responsible Performance of Offshore Oil and Gas Companies Proposing to Drill in the U.S. Arctic*, EELPC, Harvard Law School, Cambridge, MA (Dec. 2013).

46 National Commission Report to the President, *supra* note 3, at ix, 293.

APPENDIX A

Proposed Revised Form BSEE-0133

EXHIBIT A:

BSEE-0133: *Proposed Revisions Denoted in Italics and Red Font*

U.S. Department of the Interior
Bureau of Safety and Environmental Enforcement (BSEE)

Submit ORIGINAL

OMB control Number 1014-0018
OMB Approval Expires 10/31/2014

WELL ACTIVITY REPORT

BEGINNING DATE: _____ **ENDING DATE:**

REPORT IS NOT TO EXCEED 7 DAYS (1 WEEK) IN DURATION

Any information previously submitted to BSEE that is referenced in this form must be attached (in hard copy or electronic form), and will be deemed incorporated by reference and available to the public upon submission in accordance with 30 C.F.R. § 250.197(a).

☐ **CORRECTION** ☐ **CHECK IF THIS IS THE LAST WELL ACTIVITY REPORT**

GENERAL INFORMATION

1. API WELL NO. (10 digits)			2. OPERATOR NAME
3. WELL NAME	4. SIDETRACK NO.	5. BYPASS NO.	6. CONTACT NAME / CONTACT TELEPHONE NUMBER / CONTACT E-MAIL ADDRESS
7. RIG NAME OR PRIMARY UNIT *(e.g., wireline unit, coil tubing unit, etc.)*		8. WATER DEPTH (surveyed) (ft)	9. ELEVATION AT KB (Surveyed) (ft)

10. CURRENT WELLBORE INFORMATION

SURFACE			BOTTOM	
LEASE NO.	AREA NAME	BLOCK NO.	LEASE NO.	BLOCK NO.

WELLBORE	START DATE	TD DATE	STATUS	END DATE	KOP (MD)	MD	TVD	MW PPG	LAST BOP TEST DATE	LAST BOP TEST PRESSURE	
										LOW	HIGH

11. WELLBORE HISTORICAL INFORMATION

WELLBORE	BOTTOM LEASE	START DATE	TD DATE	PA DATE	FINAL MD	FINAL TVD

WELL ACTIVITY REPORT

12. CASING / LINER / TUBING RECORD

TUBULAR TYPE	HOLE SIZE (IN)	SIZE (IN)	WEIGHT (#/ft)	GRADE	TEST PRESSURE (psi)	SHOE TEST (EMW)	SETTING DEPTH *(MD)*		CEMENT QUANTITY *(cubic ft.)*
							TOP	BOTTOM	

13. WELL ACTIVITY SUMMARY

Provide a daily summary of well activities.

14. Open Hole Log Data

BSEE's Technical Data Management Section requires an Open Hole Well Report (Form BSEE-0133S) to accompany this Well Activity Report if any of the below conditions have occurred for this wellbore during this period:

☐ **None** of the following have occurred:

- **Wireline logs (Report when acquired)**
- **Wireline Directionals (Report when acquired)**
- **Velocity Surveys, VSP's, Conventional Cores, Rotary and Percussion Sidewall Cores (Report when acquired)**
- **Completed MWD/LWD logs and Mudlogs - (Report when they are completed.)**
- **PVT, Paleontological and Geochemical Samples acquired for analysis (Report at completion of Borehole)**

☐ **Any** of the above have occurred; if checked then submit Form BSEE-133S.

15. Significant Well Events

Please check as many events from the list below:

☐ Kick Occurrence	☐ Well Control Equipment Failure
☐ Shallow Water Flow	☐ H_2S Encounter
☐ Weather and Oceanographic Conditions	☐ New Technology Failure
☐ General Rig Equipment Failure	☐ Stuck Pipe
☐ Lost Returns	☐ Wellbore Integrity Failure
☐ Station Keeping Failure	☐ Other

WELL ACTIVITY REPORT

16. INFORMATION TRANSMISSION LOG

List all information relevant to environmental protection and occupational safety submitted to BSEE since completion of the last Well Activity Report for the well identified in Section 1. If this is the first Well Activity Report for this well, list all information relevant to environmental protection and occupational safety submitted to BSEE prior to completion of this form along with the date of submission:*

* *This includes, but is not limited to: (i) incident reports submitted pursuant to 30 C.F.R. § 250.187-191; (ii) information related to natural occurrences submitted pursuant to 30 C.F.R. § 250.192; (iii) information related to recompletion of wells submitted pursuant to 30 C.F.R. § 250.195; (iv) Deepwater Operation Plans and conceptual plans submitted pursuant to 30 C.F.R. §§ 250.201 and 286-292; (v) information related to Blowout Protection (BOP) procedures submitted pursuant to 310 C.F.R. §§ 250.446 and 450; (vi) information related to well-control drill plans submitted pursuant to 30 C.F.R. § 250.462, (vii) information related to H_2S and H_2S contingency plans submitted pursuant to 30 C.F.R. § 250.490; (viii) information related to tubing and well-head equipment submitted pursuant to 30 C.F.R. § 250.517; (ix) information related to casing pressure and diagnostic tests along with collective action plans submitted pursuant to 30 C.F.R. §§ 250.523-527; and (x) all Safety and Environmental Management System (SEMS) related information submitted pursuant to 30 C.F.R. §§ 250.1901-1929.*

WELL ACTIVITY REPORT

Please provide narrative information with regards to any significant events. Provide attachments, if necessary.

Appendix B

Proposed Memorandum of Agreement

Note: The following Proposed Memorandum of Agreement (MOA) is a model that includes relevant legal authorities, a structure for intra- and inter-agency collaboration, suggested timelines, and relevant definitions. This draft does not address issues such as participation of additional agencies, implementation of a pilot project, or funding.

PROPOSED MEMORANDUM OF AGREEMENT
BETWEEN THE
BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT – U.S. DEPARTMENT OF THE INTERIOR,
BUREAU OF OCEAN ENERGY MANAGEMENT – U.S. DEPARTMENT OF THE INTERIOR,
U.S. ENVIRONMENTAL PROTECTION AGENCY,
U.S. COAST GUARD – U.S. DEPARTMENT OF HOMELAND SECURITY, AND
SECURITIES AND EXCHANGE COMMISSION

Subject: Centralized Reporting System for Offshore Drilling

A. PURPOSE

The Bureau of Safety and Environmental Enforcement (BSEE), Bureau of Ocean Energy Management (BOEM), United States Environmental Protection Agency (EPA), United States Coast Guard (USCG) and Securities and Exchange Commission (SEC) share either the jurisdiction to require, or an interest in, information from entities engaged in offshore drilling activities that may be relevant to the oversight and regulation of public safety and the environment. The purpose of this Memorandum of Agreement (MOA) is to promote the coordinated oversight of offshore drilling through the creation of a centralized reporting system for offshore drilling activities that aggregates reported information in a single, searchable system that is available to the public and interested regulators.

The participating agencies will review their internal procedures and, where appropriate, revise them to be consistent with the provisions of this MOA.

B. AUTHORITIES

In order to focus on the substance of the proposed MOA, relevant authorities are noted at the end of this document.[i]

C. DEFINITIONS

1. "Application" shall mean the centralized electronic reporting system that (i) aggregates Information reported by Regulated Persons and archives it in a single accessible and searchable system, and (ii) allows for entry of Information by the Parties or by Regulated Persons.

2. "Confidential Information" shall mean information that is protected from public disclosure by Legal Authority.
3. "Effective Date" shall mean the date agreed upon by the Parties upon which this MOA will take effect.

4. "Information" shall mean any and all information, data, and documentation related to the health, safety, or environmental impact of offshore drilling and related activities, including but not limited to plans and procedures, interpreted and un-interpreted data, test results, and incident reports that Regulated Persons report, submit or otherwise provide to the Parties.

5. "Legal Authority" shall mean all statutes, executive orders, rules (as defined at 5 U.S.C. § 551(4)), orders (as defined at 5 U.S.C. § 551(6)), leases and licenses (as defined at 5 U.S.C. § 551(8)), that require Regulated Persons to disclose Information to a Party and/or protect such Information from public disclosure.

6. "Regulated Person" shall mean any person, as that term is defined in 43 U.S.C. § 1331(d), engaged in any exploration, development, or production (as defined at 43 U.S.C. § 1331(k), (l), (m)) in or related to activity in the Outer Continental Shelf (as defined at 43 U.S.C. § 1331(a)), including but not limited to, conducting any form of commercial activity on an offshore drilling facility, or transporting material to or from an offshore facility.

7. "Parties" shall mean the signatories to this MOA.

D. REQUIREMENTS

1. The Parties will establish a Joint Committee for Offshore Drilling ("Committee"). Each of the Parties will assign at least two individuals to serve as Committee members.

2. The Committee will hold an initial meeting within 90 days of the Effective Date of this MOA to establish a process and timeframe for compiling a list of Information collected by each of the Parties. At this meeting the Committee will:

   a. Establish a timeframe for selecting technical advisors, such as a software engineer or programmer and database administrator to provide advice in the development of the Application. These technical advisors will be engaged by no later than [X] months after the Effective Date.

   b. Establish a process and timeframe for creating a set of parameters that will be used by the Parties to categorize the Information and as search criteria in the Application. The parameters will be developed within [X+3] months of the Effective Date.

   c. Establish a timeframe for the Parties to compile a list of the Information, provided that such list shall be completed within [X+9] months of the Effective Date.

   d. Establish a timeframe for the Parties to: (i) review the compiled list of Information and identify gaps, areas of overlap or discrepancies; and (ii) identify measures for eliminating or mitigating any such gaps, overlaps or discrepancies. The identification and resolution of gaps, overlaps or discrepancies in the Information shall be completed, to the extent practical, prior to the implementation of the Application.

   e. Establish a process and timeframe for the creation of a review mechanism, whereby the Parties will determine whether information that Regulated Persons designate as confidential is protected from disclosure by Legal Authority.

The timeframes established pursuant to 2(b)–(d) shall include opportunities for consultations between the Parties, including at subsequent Committee meetings, and with technical advisors.

3. The Committee will designate a technical team to build and maintain the Application. The technical team may include third-party contractors, but will report to and take direction from the Committee. The Application will include the following features:

   a. Entry fields for all of the Information, including an opportunity for users entering Information to designate entries as Confidential Information.

   b. Ability for Regulated Persons to populate fields electronically and submit reports to the Parties through the Application.

   c. Searching capability for all Information in the Application based on the parameters established under section D.2(b) of this MOA.

   d. Protection of Confidential Information so that it is accessible only to personnel authorized to access it.

   e. Public access to all Information that is not designated as Confidential Information in the Application.

4. The Application will be updated to reflect any changes, including but not limited to changes in Legal Authority, which impact the Information submitted by Regulated Persons to the Parties.

   a. To the extent practicable, the Parties will ensure that any changes to their Legal Authority regarding Information collected from Regulated Persons are consistent with the requirements of the Application and this MOA.

   b. Upon making any change to the Information that Regulated Persons must submit to the Parties, the Party responsible for such change will ensure that any effected entry fields in the Application are labeled as "undergoing revisions," "revised," or "new," as appropriate.

5. The Committee will meet at least once every three months for the first two years following the Effective Date of this MOA and then at least once per year thereafter. Such meetings will include a review and discussion of the following:

a. The effectiveness of the Parties' collaboration under this MOA;

b. The status of implementation of this MOA's requirements;

c. Proposals for changes or improvements to the Application, including the parameters and list of Information developed pursuant to Section D.2 of this MOA; and

d. Any problems encountered in the implementation or use of, or access to, the Application.

E. AMENDMENTS TO THIS MOA

This MOA may be amended by mutual agreement of a majority of the Parties.

F. TERMINATION OF THIS MOA

This MOA may be terminated by a majority of the Parties after providing 30-days advance written notice to the other Parties.

[1] AUTHORITIES:

1. BSEE enters this agreement in accordance with delegated legal authorities including the Outer Continental Shelf Lands Act (OCSLA), as amended, 43 U.S.C. §§ 1331 *et seq.,* the Oil Pollution Act of 1990 (OPA), 33 U.S.C. §§ 2701 *et seq.,* Section 311 of the Clean Water Act, 33 U.S.C. § 1321, and Executive Order 12,777.

2. BOEM enters this agreement in accordance with delegated legal authorities including OCSLA, as amended, 43 U.S.C. §§ 1331 *et seq.*, OPA, 33 U.S.C. §§ 2701 *et seq.,* the Federal Oil and Gas Royalty Management Act of 1982, 30 U.S.C. §§ 1701 *et seq.,* Section 311 of the Clean Water Act, 33 U.S.C. § 1321, and Executive Order 12,777.

3. EPA enters this agreement under the authority of the Comprehensive Environmental Response, Compensation, & Liability Act (CERCLA), 42 U.S.C. §§ 103 *et seq.*, OPA, 33 U.S.C. §§ 2701 *et seq.,* the Clean Water Act, 33 U.S.C. §§ 1321 *et seq.,* the Clean Air Act, 42 U.S.C. §§ 7627 *et seq.,* and Executive Order 12,777.

4. USCG enters this agreement under the authority of 14 U.S.C. §§ 93(a)(20) and 141, OCSLA, as amended, 43 U.S.C. §§ 1331 *et seq.*, OPA, 33 U.S.C. §§ 2701 *et seq.*, the Clean Water Act, 33 U.S.C. §§ 1321 *et seq.* and Executive Order 12,777.

5. SEC enters this agreement under the authority of the Securities Act of 1933, 17 U.S.C. Chapter 2A, the Securities Exchange Act of 1934, 17 U.S.C. Chapter 2B and the Sarbanes-Oxley Act of 2002, 18 U.S.C. §§ 1350 *et seq.*

BOEM-2014-0078-0262

Kachemak Bay Conservation Society
3734 Ben Walters Ln, Homer, AK 99603
907 235.8214
kbayconservation@gmail.com

U.S. Department of the Interior
Bureau of Ocean Energy Management,
Regulation and Enforcement
Alaska OCS Region

December 22, 2014

Re. Comments, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193, Final Supplemental Environmental Impact Statement

To Whom It May Concern:
Thank you for the chance to again, comment on Lease Sale 193 for the Chukchi Sea Area.

The Kachemak Bay Conservation Society, (KBCS) is opposed with the decision to hold this lease sale. That being said, and knowing full well that the Bureau of Ocean Energy Management, Regulation and Enforcement, (BOEMRE) plans to conduct this sale, KBCS submits the following comments:

1. The U.S. Dept. of the Interior created The Outer Continental Shelf Lands Act of 1953 (OCSLA). This action provided for the leasing of Outer Continental Shelf Land (OCS) while ensuring the protection of Human, Marine, and Costal Environments along with development of resources.
   The past history of oil development shows without a doubt that there are major conflicts to the opinion that Chukchi Operations will be Safe and have No Adverse Effect to these pristine areas. Some of the these issues consist of the following:

   a. Oil spill clean up in Arctic Icy Water is an Unproved Technology. All figures and plans are based on conjecture.
   b. The effects on Marine life has not been qualified in Arctic Ice Condition as the size of an event and toxicity are an unknown.
   c. The residual effects of an oil release, which happens in winter months, will have an unknown effect on the marine environment, especially on marine mammals.

The Department of the Interion has a management goal for the Arctic which they can not meet. The oversight in the past has resulted in significant events which could have had severe consequences.This issues was demonstrated by Royal Dutch Shell and Noble Drilling's lack of Managements Understanding of Alaskan issues.

The state of global enviromental issues make it imperative that governments look beyond the present. It is very apparent that future generations will face serious global issues shuch as Ocean Acidification and Climate Change, which todays lawmakers ignore. Without rational, educated decisions by government bodies, we, in our lifetime may be able to say, We have crossed the Tipping Point.

It will be a unique experience to explain this to your children.

Thank you for the chance to comment on the Suplemental EIS.

Sincerely,
Roberta Highland
President
KBCS

The Kachemak Bay Society's mission is to protect the environment of the Kachemak Bay region and encourage sustainable use and stewardship of local natural resources through advocacy, education, information, and collaboration.

BOEM-2014-0078-0243

COMMENTS OF 32 LAW PROFESSORS

December 22, 2014

Via Online Submission to: http://www.regulations.gov

Walter D. Cruickshank
Acting Director, Bureau of Ocean Energy Management
1849 C Street, NW
Washington, DC 20240

Michael Routhier
Program Analysis, Officer and Project Manager
BOEM—Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, AK 99503-5823

Re: Comments of 32 Law Professors on Draft Second SEIS for Oil and Gas Lease Sale 193, BOEM-2014-0078

Dear Director Cruickshank and Officer Routhier:

We appreciate the opportunity to submit comments on the Bureau of Ocean Energy Management's ("BOEM's") Draft Second Supplemental Environmental Impact Statement for Lease Sale 193 ("Draft Second SEIS"), BOEM-2014-0078, which involves oil and gas leasing in the Chukchi Sea region of the Arctic. As detailed in the attached comments, NEPA plays an important role in ensuring the orderly development of the nation's oil and gas resources and in calling attention to the risks of environmental harm that accompany such development. NEPA is intended to ensure that federal agencies take environmental considerations into account before making final decisions. In the Draft Second SEIS, however, BOEM has adopted a post-decisional perspective that renders the action alternatives virtually identical to each other and fails to give the decisionmaker a meaningful choice. We hope these comments focusing on the history and purposes of NEPA will be of assistance as the agency moves forward with its NEPA analysis for offshore oil and gas drilling in the Chukchi Sea and in future offshore oil and gas development decisions.

BOEM-2014-0078-0243

Thank you very much for your consideration of the enclosed comments.

Sincerely yours,

Randall S. Abate
Professor of Law
Director, Center for International Law & Justice Project Director, Environment, Development & Justice Program
Florida A&M University College of Law

William L. Andreen
Edgar L. Clarkson Professor of Law
Director, Alabama-Australian National University Exchange Program
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Kevin Lynch
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James R. May
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Adjunct Professor of Graduate Engineering
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Patrick C. McGinley
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Charles F. Wilkinson
Moses Lasky Professor of Law
Distinguished Professor
University of Colorado Law School

Mary C. Wood
Philip H. Knight Professor of Law
Faculty Director, Environmental & Natural Resources Law Program
University of Oregon School of Law

BOEM-2014-0078-0243

COMMENTS OF 32 LAW PROFESSORS

Draft Second SEIS for Oil and Gas Lease Sale 193
BOEM-2014-0078

December 22, 2014

BOEM-2014-0078-0243

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IV. CONCLUSION

BOEM-2014-0078-0243

I. INTRODUCTION

The Bureau of Ocean Energy Management ("BOEM") held an oil and gas lease sale for large tracts of the Outer Continental Shelf ("OCS") in the Chukchi Sea, known as Lease Sale 193, in 2008. Since then, the agency has been in the process of revising the environmental impact statement ("EIS") that had been prepared for the lease sale in order to ensure better compliance with the National Environmental Policy Act ("NEPA"). NEPA's fundamental purpose is to inform decisionmakers and the public about the environmental consequences of agency action before the action is finalized, and it requires federal agencies to present a reasonable range of alternatives to allow for comparison and consideration of meaningful choices they could make in a final action. BOEM's Draft Second Supplemental Environmental Impact Statement ("Draft Second SEIS") for Lease Sale 193, however, has been prepared from a post-decisional perspective that is incompatible with the agency's obligations under NEPA. By relying on the existing leases issued in 2008 as the driving factor for its range of alternatives and its production scenario, the Draft Second SEIS fails to inform any meaningful choice for the decisionmaker.

The stakes are high in the Chukchi Sea. The Chukchi is one of the most productive ocean ecosystems in the world. Its vast, shallow sea floor and seasonal ice cover provide nutrients and pristine habitat for walruses, ice seals, whales, polar bears, and millions of birds and fish. Indeed, the Chukchi Sea is home to roughly half of America's polar bears and one-tenth of the world's population. Most of the world's Pacific walrus also use the Chukchi during the summer months. Additionally, the Chukchi supports several types of ice-dependent seals, including the ringed, ribbon, bearded, and spotted seals. The Chukchi is equally important for whales, including endangered bowhead, fin, and humpback whales, as well as gray and beluga whales. The Chukchi also hosts shorebirds, seabirds, and waterfowl, including threatened spectacled eiders, yellow-billed loons, and Kittlitz's murrelets. The U.S. side of the Chukchi Sea alone includes 18 Important Bird Areas, which serve as nesting and feeding habitats for huge colonies of resident and migrating birds.

Oil and gas development presents a substantial threat of harm to the region's abundant fish, wildlife, birds, ecosystems, and habitats, and the Alaska Native people who depend on these resources. Major oil spills, seismic impacts, air and water pollution, noise, and many other types of impacts could have devastating consequences if they are not adequately identified, avoided, and mitigated. Polar bears, walruses, and ice seals in particular are already being severely stressed by climate change and retreating sea ice, and impacts from oil and gas development could exacerbate these issues. In light of the extensive wildlife and sensitive habitat present in the Chukchi Sea, any oil and gas development should proceed with caution. The purpose of the EIS is to give the agency the ability to make well-considered choices that take into account these risks of harm.

The signatories to these comments are 32 environmental law professors from 23 law schools who have extensive knowledge and expertise concerning NEPA and its history, function, and interpretation by courts. In our view, NEPA is one of the nation's most important

environmental statutes, and the issues discussed in these comments are fundamental to the statute's effectiveness. We hope these comments will be helpful to the agency as it carries out its NEPA responsibilities in connection with Lease Sale 193 and future OCS oil and gas leasing activities.[1]

II. BACKGROUND

A. History & Framework of NEPA

The National Environmental Policy Act of 1970 ("NEPA"),[2] is one of our nation's earliest and most important environmental statutes. The statute was enacted in the wake of the 1969 Santa Barbara offshore well blowout and oil spill, which was, at the time, the worst oil spill in the nation's history. The story of the spill is remarkably similar to the more recent 2010 Deepwater Horizon disaster:[3]

> Five miles off the shore of the small beach town of Summerland, California, at 10:45 a.m. on Tuesday, January 28, 1969, crews on Union Oil Company offshore Platform Alpha were pulling the drilling tube out of well A-21 in order to assess their progress. Mud began to ooze up from the depths through the well shaft, signaling that something had gone wrong below. Within minutes, tons of mud spewed out of the top of the well propelled by a blast of natural gas. Frantic platform workers quickly capped the well, but it was too late to stop the rushing rent of oil rising from 3,000 feet below the ocean floor. The unlined walls of the well shaft gave way and oil poured into the surrounding geological formation under the sea floor. As the pressure continued to build, the oil burst upward through the roof of the Venture Anticline, ripped five long gashes in the ocean floor, and rose 188 feet through the blue-green waters of the Santa Barbara channel. The flow continued at thousands of gallons per hour for more than a week, spreading a tar-black patch seaward over eight hundred square miles of ocean. ... Then on the evening of Tuesday, February 4, the wind shifted and blew hard onshore, driving the oil into Santa Barbara harbor and fouling thirty miles of beaches up and down the coast. ... For weeks on end "[a] dense acrid stench clung to the shoreline as a force of 1000 men ... pitchforked tons of straw onto the stained sand and murky tide to soak up the mess." ... The cleanup efforts proved largely ineffective against the mass of oil, and thousands of sea birds were killed along with seals and other marine mammals. ... By February 24, another well on Platform Alpha had blown out, and the oil-gushing fractures had spread over acres of ocean floor. ... The nation was confronted with an environmental disaster of unprecedented proportions that might have been avoided but for a failure of federal oversight. A federal regulator had approved Union Oil's request to waive safety requirements that called for well shafts to be lined with hardened casing to prevent just the type of accident that occurred. ... Secretary of the Interior Walter J. Hickel immediately accepted some measure of responsibility, ... and the White House Council on Environmental Quality later acknowledged that "[t]he federal government had largely ignored the need to protect commercial, recreational, aesthetic, and ecological values of the area."[4]

Following the Santa Barbara spill, California Congressman John V. Tunney declared that "'ill-planned offshore oil drilling' was a manifestation of 'centuries of careless neglect of the environment [that] have brought mankind to a final crossroads,' and that 'the quality of our lives is eroded and our very existence threatened by our abuse of the natural world.' ... President Richard Nixon personally viewed the damage and agreed that the Santa Barbara spill 'frankly touched the conscience of the American people."'[5] One year after the spill, on January 1, 1970, President Nixon signed NEPA into law. Over the ensuing four and a half decades, NEPA has served as "'our basic national charter for protection of the environment."'[6]

A small portion of the 35 miles of California coastline and 800 square-mile area affected by the 3 million gallons of crude oil spilled offshore near Santa Barbara in 1969

NEPA's fundamental purposes are to "encourage productive and enjoyable harmony between man and his environment;" "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man;" and "enrich the understanding of the ecological systems and natural resources important to the Nation."[7] Congress recognized that "'environmental factors'" had "'frequently been ignored and omitted from consideration in the early stages of planning.'"[8] Accordingly, the "thrust of § 102(2)(C) is ... that environmental concerns be integrated into the very process of agency decision-making" and that the "detailed statement" required "is the outward sign that environmental values and consequences have been considered during the planning stage of agency actions."[9] The environmental impact statement ("EIS") is a "decision-making tool intended to 'insure that ... environmental amenities and values may be given appropriate consideration in decisionmaking.'"[10] Its purpose is to "apprise decisionmakers of the disruptive environmental effects that may flow from their decisions at a time when they retain a maximum range of options."[11]

In order for these goals to be achieved, it is essential for an environmental analysis prepared under NEPA to be completed *before* the agency makes its final decision and from an unhindered pre-decisional perspective.[12] Indeed, "[p]roper timing is one of NEPA's central themes."[13] The "'rationale behind this rule is that inflexibility may occur if delay in preparing an [environmental impact statement] EIS is allowed: 'After major investment of both time and money, it is likely that more environmental harm will be tolerated.'"[14] NEPA's implementing regulations thus "require federal agencies to 'integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values ... .'"[15] The "appropriate time for preparing an EIS is prior to a decision, when the decisionmaker retains a maximum range of options."[16]

The Ninth Circuit has "repeatedly held that dilatory or ex post facto environmental review cannot cure an initial failure to undertake environmental review."[17] In short, the "comprehensive 'hard look' mandated by Congress and required by the statute must be timely, and it must be taken objectively and in good faith, not as an exercise in form over substance, and not as a subterfuge designed to rationalize a decision already made."[18] Moreover, as the Eighth and Ninth Circuits have stressed, "'[t]he unequivocal intent of NEPA is to require agencies to consider and give effect to the environmental goals set forth in the Act, not just to file detailed impact studies which will fill governmental archives.'"[19]

B. Oil & Gas Leasing on the Outer Continental Shelf

Under the Outer Continental Shelf Act ("OCSLA"),[20] the U.S. Department of the Interior authorizes oil and natural gas development activities on the Outer Continental Shelf ("OCS") through a four-stage process: (1) five-year planning at the national level encompassing the Alaska, Gulf of Mexico, and Pacific planning regions; (2) lease sales on an area-wide basis, such as the Chukchi Sea; (3) exploration by lessees; and (4) development and production of the nation's oil and gas resources.[21] For each of these stages, the U.S. Bureau of Ocean Energy Management ("BOEM") conducts a separate review and analysis under NEPA.[22]

BOEM's current five-year program for oil and gas leasing on the OCS encompasses the years 2012-2017. It was approved by Interior Secretary Kenneth Salazar in August 2012, shortly after BOEM issued the final programmatic EIS for the program in July 2012. In each of its five-year programs, BOEM sets out a schedule for area-wide oil and gas lease sales. The first two lease sales in the Chukchi Sea—Lease Sales 109 and 126—took place in 1988 and 1991, respectively. A third lease sale—Lease Sale 193—took place in 2008, although the operation of the leases has been suspended due to litigation, as discussed further below. An additional lease sale—Lease Sale 237—is scheduled to take place in 2016.

C. Procedural History for Lease Sale 193

1. 2007 EIS & Lease Sale 193

BOEM issued an EIS for Lease Sale 193, the lease sale at issue in these comments, in May

[1] The signatories and their affiliations are listed in Appendix A. These comments represent the views of the signatory law professors in their individual capacities, not as the representatives of any academic institution or department or any other entity.
[2] 42 U.S.C. § 4321 *et seq*.
[3] For background on the 2010 Deepwater Horizon offshore well blowout and oil spill, *see, e.g.,* D. Barstow et al., *Deepwater Horizon's Final Hours* (New York Times, Dec. 25, 2010), *available at* http://www.nytimes.com/2010/12/26/us/26spill.html?pagewanted=all&_r=0 (accessed Dec. 19, 2014); A. Mascarelli, *Deepwater Horizon: After the Oil*, 467 NATURE 22 (2010), *available at* http://www.nature.com/news/2010/100901/full/467022a.html (accessed Dec. 19, 2014).
[4] *California v. Norton*, 311 F.3d 1165-66 (9th Cir. 2002) (internal citations omitted).
[5] *Id.* at 1166-67 (internal citations omitted).
[6] *Ilioulaokalani Coalition v. Rumsfeld*, 464 F.3d 1083, 1093 (9th Cir. 2006) (quoting 40 C.F.R. § 1500.1(a)).
[7] 42 U.S.C. § 4321.
[8] *Andrus v. Sierra Club*, 442 U.S. 347, 351 (1979) (quoting S. Rep. 91-296, at 20 (1969)).
[9] *Id.* at 350. *See Ilioulaokalani*, 464 F.3d at 1093 ("Congress passed NEPA 'to protect the environment by requiring that federal agencies carefully weigh environmental considerations and consider potential alternatives to the proposed action before the government launches any major federal action.'") (quoting *Lands Council v. Powell,* 395 F.3d 1019, 1026 (9th Cir. 2005)).
[10] *Sierra Club v. Peterson*, 717 F.2d 1409, 1414 (D.C. Cir. 1983) (quoting 42 U.S.C. § 4332(2)(B)).
[11] *Pit River Tribe v. U.S. Forest Service*, 469 F.3d 768, 785 (9th Cir. 2006) (quoting *Conner v. Burford,* 848 F.2d 1441, 1446 (9th Cir. 1988), *cert. denied sub nom. Sun Exploration and Production Co. v. Lujan,* 489 U.S. 1012 (1989)).
[12] *See Ilioulaokalani*, 464 F.3d at 1093 ("The regulations implementing NEPA have developed procedures to 'insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken.'") (quoting 40 C.F.R. § 1500.1(b)).
[13] *Metcalf v. Daley*, 214 F.3d 1135, 1142 (9th Cir. 2000) (quoting *Save the Yaak Committee v. Block*, 840 F.2d 714, 718 (9th Cir. 1988)).
[14] *Pit River Tribe*, 469 F.3d at 785-86 (quoting *Save the Yaak*, 840 F.2d at 718). *Accord Confederated Tribes and Bands of Yakima Indian Nation v. Federal Energy Reg. Comm'n*, 746 F.2d 466, 471-72 (9th Cir. 1984), *cert. denied* 471 U.S. 1116 (1985); *Environmental Defense Fund v. Andrus*, 596 F.2d 848, 853 (9th Cir. 1979).
[15] *Andrus*, 442 U.S. at 351 (quoting 40 C.F.R. § 1501.2). *See Pit River Tribe*, 469 F.3d at 785 ("Federal regulations explicitly, and repeatedly, require that environmental review be timely."); *Metcalf*, 214 F.3d at 1142; *Save the Yaak*, 840 F.2d at 718; *California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982).
[16] *Peterson*, 717 F.2d at 1414 (citing *Environmental Defense*, 596 F.2d at 852-53 and *Port of Astoria v. Hodel*, 595 F.2d 467, 478 (9th Cir.1979)). *Accord Pit River Tribe*, 469 F.3d at 785; *Conner,* 848 F.2d at 1446.
[17] *Pit River Tribe*, 469 F.3d at 785.
[18] *Metcalf*, 214 F.3d at 1142.
[19] *Id.* (quoting *Environmental Defense Fund v. U.S. Army Corps Eng's*, 470 F.2d 289, 298 (8th Cir. 1972)).
[20] 43 U.S.C. § 1331 et seq.
[21] *See, e.g., Sec'y Interior v. California*, 464 U.S. 312, 337 (1984).
[22] *See* 43 U.S.C. § 1346; BOEM, http://www.boem.gov/National-Environmental-Policy-Act/ (accessed Dec. 22, 2014). For convenience, these comments will refer to the agency as BOEM, notwithstanding its differing names during various stages of the Lease Sale 193 process.

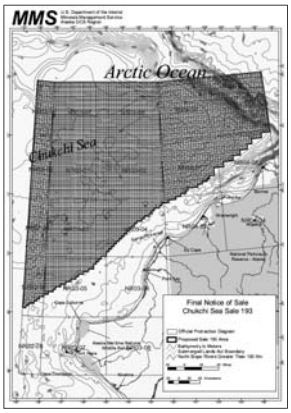
2007.[23] The agency described the four alternatives considered in the EIS as follows:

- Alternative I (proposed action)—An alternative offering for lease about 6,156 blocks or about 34 million acres, i.e., essentially the entire Chukchi Sea program area with the exception of a coastal buffer zone which had been withdrawn from oil and gas leasing through the five-year leasing process;[24]

- Alternative II (no action)—The "no action" alternative, which was described as equivalent to cancelling the lease sale;[25]

- Alternative III—An alternative excluding from leasing a larger protected corridor area along the coast consisting of approximately 1,765 blocks or 9.1 million acres, and representing about a 36% reduction of oil and gas potential available for future production as compared with Alternative I;[26] and

- Alternative IV (preferred alternative)—An alternative excluding from leasing a smaller protected corridor area along the coast consisting of a subset of approximately 795 blocks from the corridor described in Alternative III and representing about a 15% reduction of oil and gas resources available for future production as compared with Alternative I. Alternative IV was the agency's "preferred alternative" and the alternative ultimately implemented through Lease Sale 193.[27]



29.4 Million-Acre Area of Chukchi Sea Offered for Lease in Sale 193 (February 2008)

[23] BOEM, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea, Final Environmental Impact Statement (May 2007) (hereafter "2007 FEIS"). Documents relating to Lease Sale 193 are generally available on BOEM's website at http://www.boem.gov/ak193/ (accessed Dec. 19, 2014).
[24] *See* 2007 FEIS, Vol. I, at I-2, II-3. *See also* BOEM, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, Final Supplemental Environmental Impact Statement, Vol. I, Ch. II, at 19 (Aug. 2011) (hereafter "2011 SEIS").
[25] 2007 FEIS, Vol. I, at II-3.
[26] *See id. See also* 2011 SEIS, Vol. I, Ch. II, at 19.
[27] 2007 FEIS, Vol. I, at II-3. *See also* 2011 SEIS, Vol. I, Ch. II, at 20.

Shortly before the lease sale, a number of tribal entities and conservation organizations filed a lawsuit alleging violations of NEPA.[28] BOEM nevertheless proceeded with the lease sale in February 2008,[29] making available about 29.4 million acres for lease by the oil and gas industry.[30] BOEM received high bids from the oil and gas industry totaling approximately $2.6 billion, and it issued 487 leases covering approximately 2.8 million acres or about 9.5% of the original area made available for leasing.[31] A few of these leases were later relinquished by the lessees, leaving a total of 460 leases.[32]

2. 2010 Court Decision & 2011 Supplemental EIS

In 2010, the U.S. District Court for the District of Alaska found that BOEM had violated NEPA by failing to analyze the impacts of natural gas development and by failing to make certain determinations concerning missing information, as required under 40 C.F.R. § 1502.22.[33] The court ordered the agency to satisfy its obligations under NEPA,[34] and in response to the court's remand order, BOEM issued a Supplemental EIS in August 2011. For purposes of the Supplemental EIS, BOEM did not analyze any new alternatives and purported to carry forward the previous alternatives. The agency described the effect of each of the alternatives as follows:

- Alternative I (proposed action)— "By selecting Alternative I, the Secretary would elect to offer for lease all 34 million acres of the Chukchi Sea ... . Inasmuch as the sale has already been held and that sale only offered parcels identified in Alternative IV, full implementation of this Alternative is no longer feasible."[35] Accordingly, the proposed action was described as being "to affirm the issuance of leases pursuant to the Chukchi Sea OCS Oil and Gas Lease Sale 193."[36]

- Alternative II (no action)—"This 'no action' alternative is equivalent to not affirming Chukchi Sea Lease Sale 193. ... Its implementation would require the Secretary to cancel

[28] *See Native Village of Point Hope v. Salazar*, No. 1:08-cv-00004-RRB, Complaint, Doc. 1 (D. Alaska, Jan. 1, 2008).
[29] 2011 SEIS, Vol. I, Ch. I, at 1-2.
[30] BOEM, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, BOEM-2014-0078, Draft Second Supplemental Environmental Impact Statement, Vol. 1, Ch. 2, at 13 (Oct. 2013) (hereafter "Draft Second SEIS").
[31] 2011 SEIS, Vol. I, Ch. I, at 4-5.
[32] Draft Second SEIS, Vol. I, Ch. II, at 13.
[33] *See Native Village of Point Hope v. Salazar*, Civ. No. 1:08-CV-0004-RRB, Order Remanding to Agency, Doc. 136, at 20 (D. Ak., July 21, 2010).
[34] *See id.* at 21.
[35] 2011 SEIS, Vol. I, Ch. II, at 19.
[36] *Id.* Vol. I, Ch. I, at 4.

all leases awarded as a result of the February 2008 Lease Sale."[37]

- Alternative III—"Should the Secretary select Alternative III, portions of the Chukchi Sale 193 could be affirmed, but leases issued on tracts within Corridor I would be cancelled."[38]

- Alternative IV (preferred alternative)—"This alternative was identified as the Agency's Preferred Alternative in the Sale 193 FEIS, and was offered for lease as Sale 193 (February 2008). ... Selection of Alternative IV would affirm the issuance of the leases pursuant to Lease Sale 193 as held and be implemented by removing the suspension of operations imposed on the leases."[39]

The Supplemental EIS explained that "Lease Sale 193 was held consistent with Alternative IV" but that "[p]otential impacts under each alternative are nonetheless considered for consistency of this analysis with the analysis in the Sale 193 FEIS."[40]

3. 2014 Court Decision & 2014 Draft Second SEIS

Further litigation ensued, and the Ninth Circuit Court of Appeals eventually concluded that BOEM's EIS violated NEPA because the agency's reliance on an estimate that one billion barrels of oil would be economical to produce from the leasing area was arbitrary and inadequately explained.[41] The court explained that the agency had, among other things, (1) failed to justify its decision to rely on the amount of oil produced through just the first platform developed, (2) failed to discuss the economic feasibility of oil production at varying projected oil prices, (3) improperly conflated the likelihood of oil production with the amount of production that could be expected if the oilfield were developed, (4) failed to adequately respond to staff concerns regarding the unsupported estimate and, as a result, (5) the one billion barrel estimate appeared to understate likely production by a factor of about twelve.[42] BOEM argued that any error resulting from the use of the one billion barrel estimate could be corrected through site-specific EISs during the exploration and development stages of the process.[43] The Ninth Circuit disagreed, explaining that:

> An agency is required to analyze the environmental effects in an EIS as soon as it is "reasonably possible" to do so. ... An appropriate time to estimate the total oil production from the lease sale is the time of the lease sale itself. Under NEPA, BOEM is required to take into account the full environmental effects of its actions

[37] *Id.* Vol. I, Ch. II, at 19.
[38] *Id.*
[39] *Id.* at 20.
[40] *Id.* at 19.
[41] *See Native Village of Point Hope v. Jewell*, App. No. 12-35287, at 5, 21-33 (9th Cir., Jan. 22, 2014).
[42] *See id.*
[43] *See id.* at 14.

> when deciding whether and in what manner to pursue the lease sale. ... A later project or site-specific environmental analysis is an inadequate substitute for an estimate of total production from the lease sale as a whole. It is only at the lease sale stage that the agency can adequately consider cumulative effects of the lease sale on the environment, including the overall risk of oil spills and the effects of the sale on climate change. It is also only at the lease sale stage that the agency can take into account the effects of oil production in deciding which parcels to offer for lease.[44]

Further, the Ninth Circuit emphasized that, in contrast to cases considering whether agencies had improperly failed to prepare a worst case analysis, BOEM had considered "only the *best* case scenario" which "'skew[ed] the data toward fewer environmental impacts, and thus impede[d] a 'full and fair discussion of the potential effects of the project.'"[45] Finally, the Ninth Circuit treated BOEM's reliance on the one billion barrel estimate as a major flaw in its analysis given that "[t]he one billion barrel estimate was the *basis for the entire FEIS*, including its analysis of the risk of a large oil spill."[46] On remand, the Alaska federal district court ordered BOEM to complete further analysis consistent with the Ninth Circuit's decision.[47]

BOEM initiated the preparation of the Draft Second SEIS in response to the court mandate. Once again, the agency has not developed any new alternatives and purports to carry forward the previous four alternatives, which it describes as follows:

- Alternative I (proposed action)— The proposed action is "to affirm Lease Sale 193 and all of the leases issued as a result of the sale," including the "460 blocks (the Leased Area) in the Chukchi Sea Program Area."[48] "Lease Sale 193 has already been held, and no additional leases will be issued as a result of this Second SEIS process."[49] Since "[a]ll of the leases originally issued are contained in the area covered by Alternative I," "selecting Alternative I based on this Second SEIS process would result in affirming Lease Sale 193 and all of the leases."[50]

- Alternative II (no action)—"Lease Sale 193 has already occurred. Selecting Alternative II

[44] *Id.* at 31 (internal citations omitted).
[45] *Id.* at 31-32 (emphasis in original) (quoting *Native Ecosystems Council v. U.S. Forest Serv.*, 418 F.3d 953, 965 (9th Cir. 2005)).
[46] *See id.* at 26 (emphasis added). For in-depth background on Lease Sale 193 and related efforts through history to permit oil and gas activities in America's Arctic, *see* LeVine, Van Tuyn, and Hughes, *Oil and Gas in America's Arctic Ocean: Past Problems Counsel Precaution*, 37 SEATTLE UNIV. L. REV. 1271 (Summer 2014).
[47] *Native Village of Point Hope v. Salazar*, Civ. No. 1:08-CV-0004-RRB, Order in Light of Remand, Doc. 284, at 1 (D. Ak., April 24, 2014).
[48] Draft Second SEIS, Vol. 1, Ch. 1, at 4.
[49] *Id.*
[50] *Id.* Vol. 1, Ch. 2, at 13.

based on this Second EIS process would result in not affirming the lease sale and vacating the leases."[51]

- Alternative III—"Lease Sale 193 has already occurred. Five existing leases are contained within Corridor I. Accordingly, selecting Alternative III based on this Second SEIS process would result in affirming the lease sale, except the area in Corridor I" in which the leases would be vacated.[52]

- Alternative IV—"In February 2008, the Department offered for lease the area covered by Alternative IV in Lease Sale 193. All leases are contained in the area covered by this alternative. Accordingly, selecting Alternative IV as a result of this Second SEIS process would result in affirming the lease sale and all of the leases."[53]

The agency later reiterates more generally that "[n]o additional areas would be offered for lease as a result of the Second SEIS process, irrespective of which alternative is selected. Accordingly, the maximum number of leases that could remain following the Second SEIS process is 460, which could result from the selection of either Alternative I or Alternative IV."[54]

BOEM's repeated references to the 460 leases sold through Lease Sale 193 in 2008 ("Leased Area") lay the groundwork for its decision to focus its entire analysis on the existing leases. In the Draft Second SEIS, BOEM has "created an exploration, development and production scenario ('the Scenario') to provide a basis for the environmental effects analysis in this chapter," and this Scenario "represents the highest level of oil and gas activities that could reasonably result from Lease Sale 193."[55] The Scenario "assumes that current lessees will explore their leases, successfully discover an anchor field as well as a satellite field, develop necessary infrastructure, and produce ... oil and ... natural gas from the

Leased Area (Orange) Comprising 9.5% of the Chukchi Sea Program Area

[51] *Id.*
[52] *Id.*
[53] *Id.* at 14.
[54] *Id.*
[55] *Id.* Vol. 1, Ch. 4, at 149.

leases issued in Lease Sale 193."[56] BOEM's discussion of the Scenario acknowledges that the "analysis for this Scenario is unusual because Lease Sale 193 has already occurred," and the agency explains that it has "projected potential development based upon the post-sale analysis of tracts that received bids."[57] The entire environmental effects analysis in the 2014 Draft Second SEIS is "predicated" on this post-sale Scenario.[58]

BOEM makes no claim that its analysis in the Draft Second SEIS is meant to inform a meaningful choice among a range of alternatives. Instead, the agency explains the document is merely meant to "augment[] the 2007 FEIS and the 2011 SEIS by providing additional environmental analysis of potential exploration, development, and production activities from Lease Sale 193."[59]

III. BOEM'S POST-DECISIONAL APPROACH IN THE DRAFT SECOND SEIS HAS LED TO AN UNREASONABLY NARROW RANGE OF ALTERNATIVES.

The centerpiece of NEPA is its requirement for federal agencies to prepare an EIS before making a commitment to a particular project or course of action,[60] and the heart of an EIS is the agency's evaluation of a reasonable range of alternatives and their associated environmental consequences.[61] An agency must set forth a sufficient range of alternatives to "permit a 'reasoned choice.'"[62] In other words, the agency "must look at every reasonable alternative within the range dictated by the nature and scope of the proposal," and the "existence of reasonable but unexamined alternatives renders an EIS inadequate."[63] The "touchstone" of the inquiry is whether the range of alternatives "fosters informed decision-making and informed public participation."[64] In *California v. Block*, for instance, the Ninth Circuit considered the adequacy of an EIS prepared by the U.S. Forest Service in connection with its designation and management of roadless and Wilderness areas.[65] Upon review, the court noted that three of the EIS's eleven alternatives ("all Wilderness," "no Wilderness,"

[56] *Id.*
[57] *Id.* Vol. 1, Ch. 2, at 24.
[58] *Id.* Vol. 1, Ch. 4, at 149.
[59] *Id.* Vol. 1, Ch. 1, at 3.
[60] *See California*, 311 F.3d at 1168 (explaining federal agencies are "required to prepare an EIS ... before committing resources to an action"); *Sierra Club*, 717 F.2d at 1414 ("NEPA requires an agency to evaluate the environmental effects of its action at the point of commitment.").
[61] *See Ilioulaokalani*, 464 F.3d at 1095 (explaining "the alternatives analysis section is the heart of the environmental impact statement") (citing 40 C.F.R. § 1502.14). *See generally* 42 U.S.C. §§ 4332(2)(C), (E); 40 C.F.R. § 1502.1.
[62] *Block*, 690 F.2d at 767 (internal citations omitted).
[63] *Ilioulaokalani*, 464 F.3d at 1095. *See Peterson*, 717 F.2d at 1414 ("The purpose of an EIS is to insure that the agency considers all possible courses of action and assesses the environmental consequences of each proposed action.").
[64] *Block*, 690 F.2d at 767.
[65] *Id.* at 765.

and "no action") had been included merely as "points of reference rather than as seriously considered alternatives."[66] The other eight action alternatives were generated through the use of varying formulas but nevertheless ended up being very similar. Under all of the alternatives, the Forest Service would designate no more than 33% of roadless acreage as Wilderness and no less than 37% as Nonwilderness. The court held that this range of alternatives was inadequate and required the Forest Service to incorporate (1) an alternative that looks to already developed areas for expanded resource extraction and use, and (2) an alternative that allocates more than one-third of the roadless acreage to Wilderness.[67]

In its recent Draft Second SEIS, BOEM has failed to provide sufficient range of alternatives to permit a reasoned choice. In responding to the Ninth Circuit's mandate, BOEM has adopted a post-decisional perspective which takes the existing leases as a given. By doing so, BOEM has modified the alternatives to an extent that makes them virtually indistinguishable from each other. The action alternatives under consideration here have become essentially: Alternative I—affirm all 460 leases, Alternative III—affirm 455 of the 460 leases, and Alternative IV—affirm all 460 leases. Because the three action alternatives are nearly identical, this does not represent a reasonable range of alternatives on its face.[68] Indeed, BOEM expressly acknowledges that, because of its focus on the area already leased in Lease Sale 193, Alternatives I and IV are "effectively the same" for purposes of the environmental effects analysis, and it analyzes the two alternatives "together as one."[69] There is thus far less difference between the action alternatives in the present situation than there was between the action alternatives rejected as inadequate in *Block*.

BOEM's post-decisional approach also deprives both the agency and the public from having a meaningful opportunity to evaluate the possibility of precluding leasing in all or part of the Leased Area. BOEM briefly discusses stakeholder proposals for exclusionary zones that were made in public comments on the next round of leasing in the Chukchi Sea (Lease Sale 237),[70] which is scheduled to take place in 2016.[71] BOEM also acknowledges that "[v]arious stakeholders proposed fifteen exclusion areas" based on "biological, socioeconomic, or other environmental information."[72] Because 12 of these 15 areas are located "wholly outside of the Lease Sale 193 'Leased Area' considered in this Draft Second SEIS," however, they are "not considered further here."[73] BOEM thus relies on the existence of the 2008 leases as the primary basis for refusing to consider a new alternative which might have had an important bearing on the geographic scope of the leases offered for sale in the first place.

[66] *Id.*
[67] *See id.* at 767-68.
[68] As in *Block*, the "no action" alternative was included as a "point of reference" but was never seriously considered as a viable alternative.
[69] Draft Second SEIS, Vol. 1, Ch. 4, at 159.
[70] *See id.* Vol. 1, Ch. 2, at 14-15.
[71] *See* http://www.boem.gov/Oil-and-Gas-Energy-Program/Leasing/Five-Year-Program/Lease-Sale-Schedule/2012---2017-Lease-Sale-Schedule.aspx.
[72] Draft Second EIS, Vol. 1, Ch. 2, at 14.
[73] *Id.*

The other three potential exclusion areas are deemed to fall within the Leased Area—Hanna Shoal, an expanded coastal buffer, and a northern portion of the program area. BOEM admits that the "importance of Hanna Shoal to a diversity of marine mammals ha[d] been elucidated by several recent and ongoing scientific studies" and that "oil and gas activities conducted in this area" could have "adverse impacts on important biological resources such as walrus,"[74] including the fact that "population level effects to walrus could occur."[75] BOEM nevertheless declines to analyze any alternative incorporating one or more of these exclusion areas. In rejecting a possible new alternative, BOEM relies in part on the following considerations: (1) "no lessees have proposed exploring the areas at issue," (2) the lessees have shown a "demonstrated focus on other portions of the Leased Area," (3) under the terms of the leases granted under Lease Sale 193, the leases have "limited remaining duration," and (4) the stipulations included in the leases "provide[] BOEM with the discretion to require lessees to conduct additional research and to implement additional operational restrictions in order to protect biological resources."[76] BOEM's reasoning thus relies on the existence of the 460 oil and gas leases—which are supposedly the very subject matter of the agency's analysis and prospective decision-making—as part of its justification for refusing to consider an exclusion area that might preclude the issuance of some or all of those very same leases. This type of circular, post-decisional reasoning does not comport with NEPA requirements.


Pacific Walruses in the Chukchi Sea

The Ninth Circuit's reasoning in *Pit River* is instructive. In *Pit River*, a "tardy EIS" relating to geothermal energy development failed to address the key issue of "whether the land in question should be leased at all."[77] Because the belated EIS was "premised on the notion

[74] *Id.*
[75] *Id.* Vol. 1, Ch. 4, at 290.
[76] *Id.* Vol. 1, Ch. 2, at 14. BOEM also relied on the protections afforded by procedures under the Endangered Species Act ("ESA") and other statutes as a justification for declining to include any new alternative. *See id.* at 14-15. While a biological assessment ("BA") prepared under the ESA and activities under other statutes can contribute to a NEPA analysis, the Ninth Circuit has emphasized that the NEPA statute "does not indicate that a BA may substitute entirely" for a NEPA analysis. *Save the Yaak*, 840 F.2d at 718. For instance, while ESA analysis focuses solely on endangered species, NEPA requires analysis of "all facets of the environment." *Id.* Reliance on procedures under the ESA and other narrowly focused statutes is insufficient because "there may be gaps," such as a failure to consider impacts on "other wildlife" and "plant life or recreation," *id.*, and in the case of the Chukchi Sea longstanding traditional subsistence activities.
[77] *Pit River Tribe*, 469 F.3d at 786.

that the leases were valid and granted development rights" to the lessees, no matter how "lengthy and exhaustive" the analysis of environmental impacts was, the agencies had failed to take the requisite "hard look" at whether the area "should be developed for energy at all" and thus the court concluded that the issuance of the leases "violated NEPA."[78] Similarly, the Ninth Circuit's recent decision in *Native Village of Point Hope v. Jewell*, which prompted the present review, emphasized that "[i]t is only at the lease sale stage that the agency can take into account the effects of oil production in deciding which parcels to offer for lease."[79]

BOEM's range of action alternatives in the Draft Second SEIS for Lease Sale 193, however, is entirely premised on the existence of the 460 leases and leaves no room for the agency to consider "which parcels to offer for lease." As a result, the Draft Second SEIS fails to offer the decisionmaker a meaningful choice from among a reasonable range of alternatives.

BOEM cannot rely on its previous NEPA analyses to overcome this problem. The agency's task in the present review is to address a fatally flawed assumption that, according to the Ninth Circuit, had erroneously served as the "basis for the entire FEIS."[80] Instead of genuinely addressing this flaw from a pre-decisional perspective, BOEM is instead conducting a post-decisional analysis wholly shaped and driven by the existing leases. Indeed, BOEM's entire environmental effects analysis is founded upon a Scenario derived from the leases that were issued in 2008. The agency has admitted that this "post-sale" approach is "unusual,"[81] but it is more than that. By assuming the existence of the leases, BOEM has rendered the NEPA process a purely academic paper exercise—a result wholly contrary to the intentions of Congress in enacting the statute.[82]

IV. CONCLUSION

For the foregoing reasons, the Draft Second SEIS prepared by BOEM for Lease Sale 193 is flawed because of its reliance on the existing leases and its post-decisional analytical posture. The document should be revised to comport with the agency's clear and long-standing duties under NEPA. We appreciate having this opportunity to comment, and we hope these comments will inform BOEM's future approach to NEPA review with respect to Lease Sale 193 and other OCS leasing programs.

[78] *Id.* at 787.
[79] *Native Village of Point Hope*, App. No. 12-35287, at 31 (internal citations omitted).
[80] *Id.* at 26.
[81] *Id.* at 24.
[82] *See Metcalf*, 214 F.3d at 1142 (""The unequivocal intent of NEPA is to require agencies to consider and give effect to the environmental goals set forth in the Act, not just to file detailed impact studies which will fill governmental archives"") (quoting *Environmental Defense*, 470 F.2d at 298).

Appendix A

32 LAW PROFESSOR SIGNATORIES

Randall S. Abate
Professor of Law
Director, Center for International Law & Justice Project Director, Environment, Development & Justice Program
Florida A&M University College of Law

William L. Andreen
Edgar L. Clarkson Professor of Law
Director, Alabama-Australian National University Exchange Program
University of Alabama School of Law

Donald K. Anton
Professor of Law
Australian National University College of Law
Member of Bar in U.S. Supreme Court

Hope M. Babcock
Professor of Law
Co-Director, Institute for Public Representation
Georgetown University Law Center

John E. Bonine
B. B. Kliks Professor of Law
University of Oregon School of Law

Michael C. Blumm
Professor of Law
Jeffrey Bain Faculty Scholar
Lewis and Clark Law School

Jamison E. Colburn
Professor of Law
Joseph H. Goldstein Faculty Scholar
Pennsylvania State University Dickinson School of Law

Kim Diana Connolly
Professor of Law
Vice Dean for Legal Skills
Director, Environmental & Natural Resources Law Program
Director, Environmental Law & Policy Clinic
Director, Clinical Legal Education
State University of New York–Buffalo Law School

Myanna F. Dellinger
Associate Professor of Law
Director, Institute for Global Law & Policy
Western State College of Law

Timothy P. Duane
Professor of Environmental Studies, University of California, Santa Cruz
Visiting Professor of Law, University of San Diego School of Law

Stephen Dycus
Professor of Law
Vermont Law School

Carmen G. Gonzalez
Professor of Law
Seattle University School of Law

Noah D. Hall
Associate Professor of Law
Associate Dean for Student Affairs
Wayne State University Law School

Jacqueline P. Hand
Professor of Law
University of Detroit Mercy School of Law

Richard G. Hildreth
Frank E. Nash Professor of Law
Director, Ocean & Coastal Law Center
University of Oregon School of Law

Hillary M. Hoffmann
Professor of Law
Vermont Law School

Kevin Lynch
Assistant Professor of Law
Environmental Law Clinic
University of Denver Sturm College of Law

James R. May
Distinguished Professor of Law
Co-Director, Environmental Law Center
Adjunct Professor of Graduate Engineering
Widener University

Patrick C. McGinley
Judge Charles H. Haden II Professor of Law
West Virginia University College of Law

Gary D. Meyers
Professor of Law
University of Tasmania Faculty of Law

Joel A. Mintz
Professor of Law
Nova Southeastern University Shepard Broad Law Center

Laura Bucher Murphy
Assistant Professor of Law
Associate Director, Environmental & Natural Resources Law Clinic
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Patrick A. Parenteau
Professor of Law
Senior Counsel, Environmental & Natural Resources Law Clinic
Vermont Law School

Zygmunt J. B. Plater
Professor of Law
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Douglas A. Ruley
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Susan L. Smith
Professor of Law
Director of the Certificate Program in Sustainability
Willamette University College of Law

Mark S. Squillace
Professor of Law
University of Colorado Law School

Gerald Torres
Jane M.G. Foster Professor of Law
Cornell University Law School

Jack R. Tuholske
Director of Water and Justice Program
Vermont Law School

Charles F. Wilkinson
Moses Lasky Professor of Law
Distinguished Professor
University of Colorado Law School

Mary C. Wood
Philip H. Knight Professor of Law
Faculty Director, Environmental & Natural Resources Law Program
University of Oregon School of Law

Representative of National Audubon Society Submittal | Comments too voluminous to include in SEIS | All comments were reviewed and considered

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Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0289
Comment from Elizabeth Pomper, National Audubon Society

Submitter Information

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Email: lpomper@audubon.org
Phone: 2026007960
Organization: National Audubon Society

General Comment

Please find attached a Microsoft Excel file (.xlsx format) containing 40,961 comments of National Audubon Society supporters about Oil and Gas Lease Sale 193 in the Chukchi Sea Planning Area.

Many people submitted personalized comments, which you will find in a separate tab; others signed on to the comments below:

I am disappointed by the rushed environmental analysis of the oil and gas Lease Sale 193 in the Chukchi Sea. The Supplemental Environmental Impact Statement must take into account the best and most current science to sufficiently protect the incredible array of birds and other wildlife that the Chukchi Sea supports.

The Chukchi Sea is a unique and valuable resource that will be put at serious risk from oil and gas drilling. In particular, areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna

Representative of National Audubon Society Submittal | Comments too voluminous to include in SEIS | All comments were reviewed and considered

and Herald Shoals, are critical to the health of this ecosystem, and will provide resilience in the face of climate change.

Birds such as the Spectacled, Stellers, and King Eiders, Brant, Thick-Billed Murres, and Yellow-Billed Loons, along with mammals such as polar bears, Pacific walrus, bearded and ring seals, beluga and bowhead whales, and many more, must be protected from the real risk of oil spills. An oil spill in the Chukchi Sea would be devastating in this remote region, and the technology for a clean-up here is unproven.

I urge you to not to rush forward with Lease Sale 193, and to take into account the most current science available to protect wildlife, in order to ensure that this incomparable ecosystem remains pristine for future generations.

If you have any questions about the comments, or prefer to receive them in a different format, please do not hesitate to contact me. I can be reached via e-mail at lpomper@audubon.org or by telephone at (202) 600-7960.

Please accept our thanks for your agency's collaboration in ensuring that the comments of these concerned individuals are considered.

Attachments

Audubon Supporter Comments - Lease Sale 193 - upload

Representative of National Audubon Society Submittal | Comments too voluminous to include in SEIS | All comments were reviewed and considered

First Name	Last Name	City	State	Signature Date	Comments
Mary Jo	Brinker	Ellwood City	PA	12/16/2014	I am disappointed by the rushed environmental analysis of the oil and gas Lease Sale 193 in the Chukchi Sea. To fully protect the birds and other wildlife that rely on the Chukchi Sea, the Supplemental Environmental Impact Statement must take into account the best and most current science available, without rushing toward new drilling. The Chukchi Sea is a unique and valuable ecosystem that will be put at serious risk from oil and gas drilling. In particular, areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna and Herald Shoals, are critical to the health of this ecosystem, and will provide resilience in the face of climate change. Birds such as the Spectacled, Steller's, and King Eiders, Brant, Thick-billed Murres, and Yellow-billed Loons, along with mammals such as polar bears, Pacific walrus, bearded and ringed seals, beluga and bowhead whales, and many more, must be protected from the real risk of oil spills. An oil spill in the Chukchi Sea would be devastating in this remote region, and the technology for a clean-up here is unproven. I urge you to not rush forward with Lease Sale 193, and to take into account the most current science available to protect wildlife, in order to ensure that this incomparable ecosystem remains pristine for future generations.
Cynthia	Marshall	Fairfield	PA	12/16/2014	I am disappointed by the rushed environmental analysis of the oil and gas Lease Sale 193 in the Chukchi Sea. To fully protect the birds and other wildlife that rely on the Chukchi Sea, the Supplemental Environmental Impact Statement must take into account the best and most current science available, without rushing toward new drilling. The Chukchi Sea is a unique and valuable ecosystem that will be put at serious risk from oil and gas drilling. In particular, areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna and Herald Shoals, are critical to the health of this ecosystem, and will provide resilience in the face of climate change. Birds such as the Spectacled, Steller's, and King Eiders, Brant, Thick-billed Murres, and Yellow-billed Loons, along with mammals such as polar bears, Pacific walrus, bearded and ringed seals, beluga and bowhead whales, and many more, must be protected from the real risk of oil spills. An oil spill in the Chukchi Sea would be devastating in this remote region, and the technology for a clean-up here is unproven. I urge you to not rush forward with Lease Sale 193, and to take into account the most current science available to protect wildlife, in order to ensure that this incomparable ecosystem remains pristine for future generations.

Representative of National Audubon Society Submittal | Comments too voluminous to include in SEIS | All comments were reviewed and considered

Kenneth	Coley	Davidson	NC	12/16/2014	I am disappointed by the rushed environmental analysis of the oil and gas Lease Sale 193 in the Chukchi Sea. To fully protect the birds and other wildlife that rely on the Chukchi Sea, the Supplemental Environmental Impact Statement must take into account the best and most current science available, without rushing toward new drilling. The Chukchi Sea is a unique and valuable ecosystem that will be put at serious risk from oil and gas drilling. In particular, areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna and Herald Shoals, are critical to the health of this ecosystem, and will provide resilience in the face of climate change. Birds such as the Spectacled, Steller's, and King Eiders, Brant, Thick-billed Murres, and Yellow-billed Loons, along with mammals such as polar bears, Pacific walrus, bearded and ringed seals, beluga and bowhead whales, and many more, must be protected from the real risk of oil spills. An oil spill in the Chukchi Sea would be devastating in this remote region, and the technology for a clean-up here is unproven. I urge you to not rush forward with Lease Sale 193, and to take into account the most current science available to protect wildlife, in order to ensure that this incomparable ecosystem remains pristine for future generations.
Lisa	Fordham	Billings	MT	12/16/2014	I am disappointed by the rushed environmental analysis of the oil and gas Lease Sale 193 in the Chukchi Sea. To fully protect the birds and other wildlife that rely on the Chukchi Sea, the Supplemental Environmental Impact Statement must take into account the best and most current science available, without rushing toward new drilling. The Chukchi Sea is a unique and valuable ecosystem that will be put at serious risk from oil and gas drilling. In particular, areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna and Herald Shoals, are critical to the health of this ecosystem, and will provide resilience in the face of climate change. Birds such as the Spectacled, Steller's, and King Eiders, Brant, Thick-billed Murres, and Yellow-billed Loons, along with mammals such as polar bears, Pacific walrus, bearded and ringed seals, beluga and bowhead whales, and many more, must be protected from the real risk of oil spills. An oil spill in the Chukchi Sea would be devastating in this remote region, and the technology for a clean-up here is unproven. I urge you to not rush forward with Lease Sale 193, and to take into account the most current science available to protect wildlife, in order to ensure that this incomparable ecosystem remains pristine for future generations.

Representative of National Audubon Society Submittal | Comments too voluminous to include in SEIS | All comments were reviewed and considered

Ann Marie	Sunderland	Saint Paul	MN	12/16/2014	I am disappointed by the rushed environmental analysis of the oil and gas Lease Sale 193 in the Chukchi Sea. To fully protect the birds and other wildlife that rely on the Chukchi Sea, the Supplemental Environmental Impact Statement must take into account the best and most current science available, without rushing toward new drilling. The Chukchi Sea is a unique and valuable ecosystem that will be put at serious risk from oil and gas drilling. In particular, areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna and Herald Shoals, are critical to the health of this ecosystem, and will provide resilience in the face of climate change. Birds such as the Spectacled, Steller's, and King Eiders, Brant, Thick-billed Murres, and Yellow-billed Loons, along with mammals such as polar bears, Pacific walrus, bearded and ringed seals, beluga and bowhead whales, and many more, must be protected from the real risk of oil spills. An oil spill in the Chukchi Sea would be devastating in this remote region, and the technology for a clean-up here is unproven. I urge you to not rush forward with Lease Sale 193, and to take into account the most current science available to protect wildlife, in order to ensure that this incomparable ecosystem remains pristine for future generations.
Joanne	Wagner	Madison	WI	12/16/2014	I am disappointed by the rushed environmental analysis of the oil and gas Lease Sale 193 in the Chukchi Sea. To fully protect the birds and other wildlife that rely on the Chukchi Sea, the Supplemental Environmental Impact Statement must take into account the best and most current science available, without rushing toward new drilling. The Chukchi Sea is a unique and valuable ecosystem that will be put at serious risk from oil and gas drilling. In particular, areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna and Herald Shoals, are critical to the health of this ecosystem, and will provide resilience in the face of climate change. Birds such as the Spectacled, Steller's, and King Eiders, Brant, Thick-billed Murres, and Yellow-billed Loons, along with mammals such as polar bears, Pacific walrus, bearded and ringed seals, beluga and bowhead whales, and many more, must be protected from the real risk of oil spills. An oil spill in the Chukchi Sea would be devastating in this remote region, and the technology for a clean-up here is unproven. I urge you to not rush forward with Lease Sale 193, and to take into account the most current science available to protect wildlife, in order to ensure that this incomparable ecosystem remains pristine for future generations.

Representation of Submittal Signature pages too voluminous to incorporate in SEIS

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0142
Comment from Murray Susan, Oceana

Submitter Information

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Fax: 907 586 4944
Organization: Oceana

General Comment

Mr. Walter Cruickshank
Acting Director
Bureau of Ocean Energy Management
1849 C Street, NW
Washington, D.C. 20240

RE: Chukchi Sea Oil and Gas Lease Sale 193 draft Supplemental Environmental Impact Statement

Dear Director Cruickshank:

Please see the attached comment letter signed by 31,812 people.

Sincerely,

Susan Murray
Deputy Vice President, Pacific
Oceana
Juneau, Alaska

Representation of Submittal Signature pages too voluminous to incorporate in SEIS

Attachments

Final Lease Sale 193 SEIS Letter w_signatures 11_17_14

file:///S|/...20Sale%20193/FDMS%20Downloads/Document%20List%2018-12-2014%2019-13-42-435_docs/BOEM-2014-0078-0142.html[12/19/2014 12:12:18 PM]

Representation of Submittal Signature pages too voluminous to incorporate in SEIS

OCEANA

December 18, 2014

Mr. Walter Cruickshank
Acting Director
Bureau of Ocean Energy Management
1849 C Street, NW
Washington, D.C. 20240

RE: Chukchi Sea Oil and Gas Lease Sale 193 draft Supplemental Environmental Impact Statement

Dear Director Cruickshank:

The Chukchi Sea is unique and important. It is home to iconic species of wildlife, including walrus, whales, seals, and polar bears. It is also a centerpiece of the subsistence way of life supporting coastal communities for millennia. The Chukchi Sea was put at risk by a poor decision made by the George W. Bush administration in 2008 to offer oil companies tens of millions of acres in Lease Sale 193. That decision was illegal in 2008, and so was your decision to recommit to it in 2010. You now have the opportunity and obligation to chart a new course for the Chukchi Sea based on science and precaution. I urge you not to commit, once again, to Lease Sale 193.

As Shell's failed efforts to drill exploration wells in 2012 reminded us, the Arctic is remote, dangerous, and unforgiving. There is no proven technology capable of responding to a spill in icy Arctic conditions, and companies simply are not ready to operate in the Arctic Ocean. The fact that those companies have spent billions of dollars to purchase leases and pursue exploration is not sufficient reason to continue to seek to justify the bad decision to sell those leases in the first place.

The 2008 decision to hold Lease Sale 193 was made despite widely acknowledged gaps in scientific information, the complete lack of proven response technologies for the harsh and unforgiving Arctic Ocean conditions, and substantial problems in the outreach and decision-making process in the Alaska region of the Minerals Management Service. Some progress has been made, but neither the government nor companies are ready for oil drilling in the Arctic Ocean.

The Chukchi Sea is too important to risk for questionable, short-term gain. Please cancel Lease Sale 193.

Sincerely,

Representative of Ocean Conservancy Submittal Attachment to voluminous to include in SEIS All comments were reviewed and considered

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Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0164
Comment from Andrew Hartsig, NA

Submitter Information

Name: Andrew Hartsig
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Anchorage, AK, 99501
Email: AHartsig@oceanconservancy.org
Organization: NA

General Comment

December 19, 2014

Dear Walter D. Cruickshank
Acting Director, Bureau of Ocean Energy Management
381 Eldon Street
Herndon, VA 20170

The 34,000 attached signatures urge you not to affirm Lease Sale 193, and to say no to risky offshore oil and gas drilling in the Arctic. The Chukchi Sea is an enormously productive marine environment used by a diverse array of wildlife including walruses, ice-dependent seals, sea birds, polar bears, and bowhead and beluga whales. The region is also home to vibrant communities that depend on a clean and healthy ocean environment.

The latest environmental analysis predicts a 75% chance of a large oil spill if the offshore leases lead to production and development. A major oil spill in the Chukchi Sea could have disastrous consequences for the marine ecosystem and the wildlife and people who depend on it. Given the region's remoteness, extreme weather, and lack of infrastructure, cleaning up an oil spill in the Arctic Ocean would be all but impossible.

Even now, an unmanned barge carrying 950 gallons of diesel fuel is drifting in the Arctic Ocean after it broke loose from its tug during a severe storm. Adverse weather conditions, advancing sea ice,

Representative of Ocean Conservancy Submittal | Attachment to voluminous to include in SEIS | All comments were reviewed and considered

and lack of response vessels combined to prevent recovery of the barge, which will likely spend the winter trapped in the Arctic ice. This is just one example of the challenges of operating in the Arctic environment. Shell's error-plagued 2012 drilling season is another warning that oil and gas companies are not able to operate safely and responsibly in the Arctic at this time.

Please say no to risky drilling in the Arctic and select the "no action" alternative.

Sincerely,

Attachments

Arctic Signers

Arctic Signers 2 of 2

December 19, 2014

Representative of Ocean Conservancy Submittal | Attachment to voluminous to include in SEIS | All comments were reviewed and considered

Dear Walter D. Cruickshank
Acting Director, Bureau of Ocean Energy Management
381 Eldon Street
Herndon, VA 20170

The undersigned urge you not to affirm Lease Sale 193, and to say no to risky offshore oil and gas drilling in the Arctic. The Chukchi Sea is an enormously productive marine environment used by a diverse array of wildlife including walruses, ice-dependent seals, sea birds, polar bears, and bowhead and beluga whales. The region is also home to vibrant communities that depend on a clean and healthy ocean environment.

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Please say no to risky drilling in the Arctic and select the "no action" alternative.

Sincerely,

Linda A.Fighera	MIRIAM AGUDA	ARTHUR ALENIK
Representative of Ocean Conservancy Submittal	Attachment to voluminous to include in SEIS	All comments were reviewed and considered
RIHANN ALI	gina ANSON	WILLIAM ASHWORTH
VICTORIA A. & ROSE M. AZPURU	Ramiro Abal	Steve Abbott
Marlene Abel	Charles Abeyta	Pam Abirached
Tina Abner	Janne Abullarade	Kaitlyn Aceron
Matthew Ackerman	Inger Acking	Julie Acs-Ray
Carina Acuna	Patricia Adamo	Debra Adams
Harrriet Adams	Lauren Adams	Marsha Adams
Shannon Adams	Barry Eshkol Adelman	Alissa Adler
Kitty Adlington	Miss Novella Adoue	Ian Adrian
Honora-Bright Aere	Barbara Agnew	Carlinda Agrella

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

PUBLIC SUBMISSION

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0166
Comment from Dan Ritzman, Sierra Club

Submitter Information

Name: Dan Ritzman
Organization: Sierra Club

General Comment

On behalf of the 2.4 million members and supporters of the Sierra Club I respectfully submit the attached files that represent the 221,932 actions taken by our members and activists this year requesting that you do not allow drilling activities associated with Lease Sale 193 in the Chukchi Sea.

According to the administration's own report about the environmental impacts of gas and oil drilling in the Chukchi Sea there is a 75% chance of an oil spill disaster.

In 2012, Shell's oil drilling season failed dramatically when one of its drilling rigs ran aground off of Kodiak Island, Alaska. The drilling rig's critical oil spill containment dome was crushed like a "beer can" during testing and both of its drilling rigs came under federal investigation.

Based on Shell Oil's disastrous track record and according to the government's own report -- it's not if an oil spill will happen, but when. If we want to protect our iconic wildlife and our sensitive ecosystems, we should not to drill in America's Arctic.

The administration cannot continue to push an outdated and dangerous 'all of the above' energy strategy, encouraging mega oil companies to take ever increasing risks to capture the last of the oil, hastening dangerous global climate change and putting the Arctic and the iconic wildlife that call it home in peril.

If we are serious about addressing climate change safeguarding America's Arctic Ocean from oil and gas drilling would be a tremendous step forward.

We urging you to take a big step toward a clean energy future and declare Arctic drilling 'off limits' forever. Lease 193 cannot, in the face of all the evidence about the dangers of Arctic drilling and climate change, be allowed to go forward.

The attached files contain a spreadsheets of all action takes and all of the individual letters where people modified our actions.

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

FinalProtectArcticRingSealsSpreadsheet

FinalProtectAmericasArcticOceanSpreadsheet

ProtectTheArcticfromanoilspilldisasterID#13225_AlertResponses

ShellCancelsArcticDrillingin2014...AlertID#12799

Sierra_Care2Signatures_20141217_PolarBearSeas

Sierra_Care2Signatures_20141217_ProtectArctic

Sierra_Care2Signatures_20141217_ShellCancelsDrilling

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

Emma Ruggiero
PO Box 135
Greenbank, WA 98253-0135

Feb 4, 2014

Comment Delivery

Subject: Cancel all Arctic drilling leases and place a moratorium on all future lease sales!

Dear Comment Delivery,

The Court of Appeals for the Ninth Circuit has ruled that the Department of the Interior failed to conduct an adequate environmental impact assessment before selling large areas in the Arctic Ocean for oil and gas exploration. Now Shell has announced that it cannot drill in 2014.

The Court concluded that the Department's estimate of one billion barrels of recoverable oil under the frozen Arctic Ocean was "chosen arbitrarily" and that the Department of the Interior "based its decision on inadequate information about the amount of oil to be produced pursuant to the lease sale 193."

You cannot keep in place a lease that examined only the best case scenario for environmental harm. By choosing a low figure that only reflects the best case scenario, data in the EIS (and other assessments that relied on that figure) were skewed toward fewer environmental impacts, which the court said impeded a full and fair discussion of the potential effects of the project.

I am urging you to cancel the current lease under which several oil companies want to drill in the Chukchi Sea and to stop the process to sell new leases in the Arctic Ocean.

Sincerely,
Emma Ruggiero

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

Colleen Sarna
70 E Lake St
Chicago, IL 60601-5959

Feb 4, 2014

Comment Delivery

Subject: Terminate current Chukchi drilling leases and cancel on all future Arctic Ocean lease sales!

Dear Comment Delivery,

The Court of Appeals for the Ninth Circuit has ruled that the Department of the Interior failed to conduct an adequate environmental impact assessment before selling large areas in the Arctic Ocean for oil and gas exploration. Now Shell has announced that it cannot drill in 2014.

Drilling in the Arctic is a dangerous and risky business--for companies' bottom lines, for the environment, and for our climate. Downplaying those risks does not make them go away, as Shell's disastrous experience in 2012 demonstrated.

It's clear that the Arctic Ocean is the last place we should be drilling for oil. The Arctic seas are home to a unique plethora of wildlife, including the entire US population of polar bears and serve as an important migration route for bowhead and beluga whales. They are also home to some of the most extreme and dangerous conditions on the planet, and to stores of carbon pollution that could dramatically alter our climate if released, negating positive steps to fight the climate crisis.

I am urging you to terminate the current leases in the Chukchi Sea and to cancel the process to offer new leases in the Arctic Ocean.

Sincerely,
Colleen Sarna

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

Nathan Riding
PO Box 20021
Seattle, WA 98102-1021

Feb 4, 2014

Comment Delivery

Subject: Terminate current Chukchi drilling leases and cancel on all future Arctic Ocean lease sales!

Dear Comment Delivery,

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Sincerely,
Nathan Riding

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

Benjamin McHugh
1635 California St Apt 44
San Francisco, CA 94109-4662
(415) 940-2809

Feb 4, 2014

Comment Delivery

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Sincerely,
Benjamin McHugh

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

Nathan Riding
PO Box 755
San Francisco, CA 94104-7001

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Sincerely,
Nathan Riding

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

Cheryl Kline
6168 Saddleback Way
Camarillo, CA 93012-4421

Feb 4, 2014

Comment Delivery

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Sincerely,
Cheryl Kline

Representative of Sierra Club Submittal | Document is too voluminous to include in SEIS | All comments were reviewed and considered

Mr. Nathan Riding
PO Box 20021
Seattle, WA 98102-1021

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I am urging you to terminate the current leases in the Chukchi Sea and to cancel the process to offer new leases in the Arctic Ocean.

Sincerely,
Mr. Nathan Riding

Representative of Sierra Club Submittal

Document is too voluminous to include in SEIS

All comments were reviewed and considered

Ms. Geraldine Dickel
190 Nicoll St
New Haven, CT 06511-2624

Feb 4, 2014

Comment Delivery

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I am urging you to terminate the current leases in the Chukchi Sea and to cancel the process to offer new leases in the Arctic Ocean.

Sincerely,
Ms. Geraldine Dickel

Robert Dickinson
19 Birch Rd
South Windsor, CT 06074-3134
(860) 644-1986

Dec 12, 2014

Jon Kurland

Subject: I support critical habitat for ringed seals

Dear Jon Kurland,

I strongly support designation of critical habitat for ringed seals in the Bering, Chukchi, and Beaufort seas.

Ringed seals rely on sea ice to live, hunt, give birth and nurse their pups, while pups need it to be able to molt and build up enough blubber to keep them warm in the cold water. Ringed seals also need to build ice caves to protect their young from freezing temperatures and predators. Unfortunately, their ability to make snow caves is threatened by late ice formation in the fall, rain-on-snow events in the late winter, earlier break-up of spring ice, as well as decreasing snow depths, which are projected to be too shallow for snow cave formation by the end of the century.

The scientific evidence shows that sea ice is projected to shrink in extent and duration in the future. Already this year Arctic sea ice coverage reached the sixth lowest extent recorded since 1978, while some estimates predict the Arctic could be ice-free before the end of the century. Which makes this critical habitat designation of more than 350,000 square miles in the northern Bering, Chukchi and Beaufort seas off the coast of Alaska all the more important.

The best available information identifies the habitat features that are essential for sustaining Arctic ringed seals. The melting sea ice that is so crucial to ringed seals supports a wide variety of wildlife, including polar bears and walruses.

The National Marine Fisheries Service and other federal agencies in the Departments of Commerce and Interior should take into account the potential impacts from oil and gas exploration and development in this critical habitat area and deny any permits for oil and gas development and cancel plans for future lease sales.

Sincerely,
Robert Dickinson

James A Langham
9603 Powhatan Dr
Apt J2
San Antonio, TX 78230-3140
(210) 605-0066

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Sincerely,
James A Langham

Kelsey Harmon
599 SE 105th Rd Apt A
Warrensburg, MO 64093-9405

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Sincerely,
Kelsey Harmon

Gretchen Knudsen
10309 3rd Ave S
Seattle, WA 98168-1379

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Sincerely,
Gretchen Knudsen

Mr. Henry Bailey
400 Governors Dr Apt 4
Winthrop, MA 02152-3217
(617) 539-0853

Nov 26, 2014

Secretary Sarah Jewell
Interior Building, Room 6156
1849 C Street, NW
Mail Stop 7229
Washington, DC 20240

Subject: Declare America's Arctic Ocean off limits to drilling once and for all!

Dear Secretary Jewell,

According to the administration's own report about the environmental impacts of gas and oil drilling in the Chukchi Sea there is a 75% chance of an oil spill disaster.

In 2012, Shell's oil drilling season failed dramatically when one of its drilling rigs ran aground off of Kodiak Island, Alaska. The drilling rig's critical oil spill containment dome was crushed like a "beer can" during testing and both of its drilling rigs came under federal investigation.

Based on Shell Oil's disastrous track record and according to the government's own report -- it's not if an oil spill will happen, but when. If we want to protect our iconic wildlife and our sensitive ecosystems, we should not to drill in America's Arctic.

The administration cannot continue to push an outdated and dangerous 'all of the above' energy strategy, encouraging mega oil companies to take ever increasing risks to capture the last of the oil, hastening dangerous global climate change and putting the Arctic and the iconic wildlife that call it home in peril.

If we are serious about addressing climate change safeguarding America's Arctic Ocean from oil and gas drilling would be a tremendous step forward.

I am urging you to take a big step toward a clean energy future and declare Arctic drilling 'off limits' forever. Lease 193 cannot, in the face of all the evidence about the dangers of Arctic drilling and climate change, be allowed to go forward.

Sincerely,
Mr. Henry Bailey

Ms. Doreen Delgado
24525 Breckenridge Pl
Newhall, CA 91321-2607
(661) 291-1122

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Sincerely,
Ms. Doreen Delgado

Elbereth Gilthoniel
Kamen 12
Split, MD 21212

Mar 28, 2014

Comment Delivery

Subject: Terminate current drilling leases and cancel all future Arctic Ocean lease sales!

Dear Comment Delivery,

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I am urging you to terminate the current leases in the Chukchi Sea and to cancel the process to offer new leases in the Arctic Ocean.

Sincerely,
Elbereth Gilthoniel

Emery Goff
158 Middle St
Farmington, ME 04938-6908
(207) 778-6908

Mar 28, 2014

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Sincerely,
Emery Goff

PUBLIC SUBMISSION

As of: December 22, 2014
Received: December 19, 2014
Status: Posted
Posted: December 22, 2014
Tracking No. 1jy-8g5c-ia2u
Comments Due: December 22, 2014
Submission Type: Web

Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0193
Comment from Margaret Willliams, WWF US Arctic Field Program

Submitter Information

Name: Margaret Willliams
Address:
406 G Street
Suite 301
Anchorage, AK, 99501
Email: margaret.williams@wwfus.org
Phone: 907-279-5504
Fax: 907-279-5509
Organization: WWF US Arctic Field Program

General Comment

See attached file for Comments on Oil and Gas Lease Sale 193 Draft Second Supplemental Environmental Impact Statement for the Chukchi Sea Planning Area (OCS EIS/EA BOEM 2014-653).

Attachments

2014-12-19 -- LS 193 WWF comments FINAL DRAFT

Attachment 2 - WWF Factsheet Modeling Oil Spills

World Wildlife Fund
Arctic Field Program
406 G Street, Suite 301
Anchorage, AK 99501

Tel: (907) 279-5504
Fax: (907) 279-5509
www.worldwildlife.org

December 22, 2014

Submitted via Regulations.gov, Docket No. BOEM–2014–0078

Walter D. Cruickshank, PhD
Acting Director, Bureau of Ocean Energy Management
BOEM, Alaska OCS Region
3801 Centerpoint Drive Suite 500
Anchorage, Alaska 99503-5823

Re: Comments on Oil and Gas Lease Sale 193 Draft Second Supplemental Environmental Impact Statement for the Chukchi Sea Planning Area (OCS EIS/EA BOEM 2014-653)

Dear Acting Director Cruickshank:

World Wildlife Fund ("WWF") hereby submits the following comments on the Bureau of Ocean Energy Management's ("BOEM") draft Second Supplemental Environmental Impact Statement for Oil and Gas Lease Sale 193 in the Chukchi Sea Planning Area ("draft Second SEIS").[1] These comments complement the letter concurrently submitted to BOEM by WWF jointly with other groups, in which we share a rigorous scientific and legal analysis of the deficiencies in the draft Second SEIS.

WWF's mission is to conserve nature and reduce the most pressing threats to the diversity of life on our planet. As the world's leading conservation organization, WWF works in 100 countries and is supported by 1.2 million members in the United States and close to 5 million members globally. WWF is unique in that we combine global reach with local action, informed by a foundation in science and aimed at innovative solutions that meet the needs of both people and nature.

WWF considers the Arctic region a global priority for conservation, as it is one of the few places where vast expanses of wildlife habitat remain on Earth, and where human communities are integrally linked to the cultural and nutritional values supported by the natural environment. The highly productive Arctic Ocean is home to an impressive array of wildlife species, pristine and diverse breeding and feeding habitats, and numerous thriving indigenous communities. Birds from every continent migrate to the Arctic's shores to nest in the summer. Gray whales from

[1] BOEM, Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193, Draft Second Supplemental EIS (OCS EIS/EA BOEM 2014-653) [hereafter "draft Second SEIS"], 79 Fed. Reg. 66,401 (Nov. 7, 2014) (Notice of Availability).

Mexico, Humpback whales from Hawaii, and Bowhead whales from the Bering Sea are drawn to this food-rich region to breed and forage each year.

The Chukchi Sea, a pristine and productive marine environment, is home to walruses, polar bears, bearded seals, ringed seals and many other marine mammals.[2] The Chukchi Sea ecosystem also is inexorably linked to other systems around the planet by ocean and air currents and by the many species of birds, fish, and marine mammals that migrate great distances through the course of their lives. Environmental processes and human activities in the Chukchi Sea thus have global implications.

WWF is committed to a comprehensive global approach to Arctic conservation. From our office in Alaska, we work closely with WWF staff based in Russia and Canada in the Bering, Chukchi and Beaufort Seas. We are also part of a Global Arctic Program, which encompasses work in biodiversity conservation, marine governance, and promoting responsible practices within industry. Our general approach to place-based conservation action in the Arctic is outlined in WWF's Rapid Assessment of Circum-Arctic Ecosystem Resilience ("RACER").[3] RACER emphasizes the need to identify environmental drivers such as currents and bathymetric features as a key approach to protecting areas that are most likely to persist in high productivity and biodiversity.

WWF has also participated in prior BOEM decisions concerning the management of human activities in and near the Chukchi Sea, including oil and gas leasing and shipping.[4] And as a party to the litigation requiring BOEM to undertake two separate revisions to its EIS analysis for Chukchi Sea Lease Sale 193, WWF has worked to ensure that the agency utilizes the best available scientific information to guide decisions in the Arctic.[5]

WWF recently commissioned a study, using up-to-date scientific and modeling technology, to assess a range of oil spills in the Beaufort Sea from different sources and volumes and at different times of year.[6] The study – conducted by RPS APA, a world leader in modeling the transport, fate, and biological effects of oil in marine environments – analyzed the impacts to

[2] Indeed, the importance and sensitivity of pristine Chukchi Sea habitat is highlighted by a recent proposal from NOAA's National Marine Fisheries Service to designate the entire U.S. boundary of the Chukchi Sea as critical habitat for Arctic ringed seals. NOAA, Endangered and Threatened Species; Designation of Critical Habitat for the Arctic Ringed Seal, 79 Fed. Reg. 71,714 (Dec. 3, 2014) (proposed rule).
[3] http://wwf.panda.org/what_we_do/where_we_work/arctic/what_we_do/climate/racer/
[4] See, e.g., WWF Comments, Call for Information and Nominations, Proposed Chukchi Sea Lease Sale 237 (Dec. 3, 2013), *available at* http://www.regulations.gov/#!documentDetail;D=BOEM-2013-0015-0027 and http://www.regulations.gov/#!documentDetail;D=BOEM-2013-0015-0028.
[5] *Native Village of Point Hope v. Salazar*, 730 F. Supp. 2d 1009 (D. Alaska 2010) (remanding the 2007 EIS to BOEM); *Native Village of Point Hope v. Jewell*, 740 F.3d 489, 492 (9th Cir. 2014) (remanding the 2011 SEIS to BOEM).
[6] WWF, *Report: US Communities and Wildlife Would be Affected by Arctic Oil Spill* (July 25, 2014), http://www.worldwildlife.org/stories/report-us-communities-and-wildlife-would-be-affected-by-arctic-oil-spill [hereinafter "RPS APA Report"]. Study available at http://awsassets.wwf.ca/downloads/wwf_beaufort_sea_oil_spill_modelling_full_report_rps_asa.pdf and enclosed as Attachment 1.

U.S. Arctic communities and marine wildlife if an oil spill were to occur in the Canadian Beaufort Sea and serves as an exemplary model for conducting oil spill trajectory analyses. As the RPS APA study demonstrates, spilled oil is especially difficult to contain in Arctic Ocean conditions, spill response measures (e.g. use of chemical dispersants) create their own long-term risks, and modeling and spill response planning can be greatly improved by local knowledge about historical, environmental, and oceanographic conditions.[7] Based on this study WWF urges policymakers, including BOEM, to: increase use of best available environmental and socio-ecological data; implement an ecosystem-based approach at national and eco-regional scales; improve oil spill modeling for all areas where oil resources are being developed or shipped; conduct comprehensive environmental risk assessments; implement appropriate spatial and temporal measures to reduce oil spill impacts to sensitive areas; and improve oil spill responses.[8]

With respect to the draft Second SEIS, in addition to the specific deficiencies discussed at length in the joint letter noted above, WWF addresses notable shortcomings associated with BOEM's oil spill analysis and provides BOEM with suggestions to revise the draft Second SEIS to include the best available information and science. BOEM can and should improve the draft Second SEIS analysis of oil spill trajectories—particularly by utilizing updated modeling methodologies and by including more updated data and information.

First, as to the type of modeling utilized in its draft Second EIS, BOEM's oil spill trajectory analysis falls short of what can be analyzed with newer modeling techniques that use stochastic probability among other up-to-date methods. For example, the RPS APA report modeled a range of spills from a multitude of different sources (such as oil and gas drilling, deep well blowouts, shipping, and pipelines), based on different volumes, and set at different times of the year, resulting in the mapping of 22 different spill scenario trajectories. RPS APA used computer trajectory modeling software known as the Spill Impact Modeling Application ("SIMAP") and OILMAPDeep to estimate the trajectories and fates of the 22 scenarios. The SIMAP modeling program produced graphs, maps, and animations for each spill scenario, illustrating events such as: oil encountering sea ice; direction and distance of surface oil slicks; oil amounts entering the water column; amount of affected shoreline; and time elapsed for the oil to spread and reach the shoreline.[9] Importantly, RPS APA's modeling estimated these trajectories and fates through *both* stochastic as well as individual trajectory modeling outputs.

In comparison, BOEM's oil spill trajectory analysis relies on its Oil Spill Risk Analysis ("OSRA"), the same modeling technique it has used since the 1980s without much change.[10] Instead of including a stochastic modeling output, the OSRA model merely produces "tables of conditional impact probabilities (that is, the probability of hitting a resource, given that a spill has occurred), as well as probability distributions for oil spills occurring and contacting environmental resources within preselected vulnerability time horizons."[11] While probabilities of individual trajectories are helpful in evaluating risk, BOEM should also utilize stochastic output models to obtain a more complete trajectory analysis and to better inform its decision-

[7] WWF, *Factsheet—Modeling Oil Spills in the Beaufort, Bering and Barents Seas* (2014), enclosed as Attachment 2.
[8] *Id*. at 5-7.
[9] WWF, *Summary Report—Modeling Oil Spills in the Beaufort Sea* 7 (2014), *available at* http://awsassets.wwf.ca/downloads/wwf_beaufort_sea_oil_spill_modelling_summary_report.pdf.
[10] Smith, et al., *The Oilspill Risk Analysis Model of the U.S. Geological Survey* (1982).
[11] Smith, et al., at 1.

making process. Indeed, stochastic modeling should be useful to BOEM because it can readily be adjusted for multiple differing oil spill volume scenarios, including the Very Large Oil Spill ("VLOS") scenario that BOEM analyzes separately and with more limited data.[12] WWF recommends that BOEM update its oil spill trajectory analysis to utilize stochastic modeling techniques in addition to the individual trajectory probability analyses currently utilized.

Second, BOEM's oil spill risk and trajectory analyses should use the most current data possible on ocean circulation, meteorology, sea ice, modeled surface currents, and winds as well as include additional oil spill parameters and effects which BOEM has not previously considered. For example, to ensure the best data was utilized in its modeling, the RPS APA study utilized a full review of the latest literature and gathered government datasets on environmental and geographic conditions in areas such as bathometry, shoreline classification, long-term wind and hydrodynamics, average temperature/water column profiles, ocean circulation, and ice circulation.[13] The RPS APA study also includes the following: modeling for dissolved oil components such as soluble polynuclear aromatic hydrocarbons ("PAHs") and monoaromatic hydrocarbons ("MAHs"), which may dissolve into the water column and cause long-term toxicity;[14] oil spill trajectories for scenarios involving oil tankers and vessel supply;[15] and 3-dimensional models for ocean current speed and direction, surface sea ice drift speed and direction, and ice thickness.[16]

By comparison, BOEM's OSRA model contains significant data gaps limiting its usefulness. On the whole, the OSRA modeling relies on data from nearly 30 years ago to define two extremely important spill trajectory parameters – ice and wind – and runs simulations from points in time in the 1980s, a time when these parameters differ greatly from today's conditions.[17] The OSRA model also fails to include a large spill or VLOS trajectory analysis for scenarios involving shipping accidents.[18] Further, the OSRA model fails to include any modeling on the long-term

[12] Of the 22 scenarios analyzed by the RPS APA report, 15 scenarios are considered "Very Large Oil Spills" as defined by BOEM as spills greater than 150,000 bbl. RPS APA Report, Exec. Summary at v-ix. By comparison, BOEM's oil spill trajectory analysis for VLOS relies almost exclusively on historical examples. Draft Second SEIS, Volume 2 at A-19 to A-33. BOEM also notes the issues with extrapolating the large oil spill analysis onto a VLOS scenario. *Id.* at A-29.
[13] *See* RPS APA Report, Exec. Summary at iii-iv (summarizing some of the datasets and studies used to inform the modeling).
[14] RPS APA Report at 6.
[15] *Id*., Exec. Summary at vii.
[16] *Id.*, Exec. Summary at iv.
[17] Draft Second SEIS, Volume 2 at A-10 to A-12 ("The OSRA model launches a hypothetical oil-spill trajectory from a hypothetical location … starting on day 1 on 1986, and it continuously launches the trajectory every other day for a total of 18 years (1986-2004)…. The trajectories are driven by the three-hourly wind, current and ice data from a coupled ocean-ice model with 20 years (1985-2005) of simulation…").
[18] The RPS APA report included six shipping scenarios, ranging between 5,400 to 533,000 bbl spilled from tankers and support vessels. *Id*., Exec. Summary at vii. By comparison, BOEM's analysis only includes oil tankers and support vessels in the VLOS scenario (greater than 150,000 bbl spilled) and only mentions these oil sources in a cursory manner, avoiding any trajectory analysis. Draft Second SEIS, Volume 2 at A-25 ("BOEM did not consider the loss of a fully loaded tanker."). At a minimum, it would seem prudent for BOEM to include shipping-related spills as a potential cumulative impact.

presence and trajectories of PAHs and MAHs oil components in the water column.[19] WWF recommends that BOEM revise its oil spill trajectory analysis for the entire Chukchi Sea with updated data and to fill significant gaps in its analysis. In particular, BOEM must update its oil spill model data in order to improve its analysis about potential VLOS scenarios impacting specific Chukchi Sea regions previously identified by WWF as special areas warranting protection.[20] BOEM should more explicitly address potential oil spill impacts to these special areas in the Second SEIS.

Further, updating its oil spill analysis before finalizing the Second SEIS is the minimum step that BOEM should take. BOEM itself acknowledges that the risk of major oil spills in the Arctic is high.[21] Meanwhile, none of the three primary oil spill response methods – mechanical containment and recovery, *in situ* burning, or dispersants – are proven effective in Arctic conditions.[22] Infrastructure is also lacking in America's Arctic to support offshore oil and gas operations, including emergency response.[23] Oil and gas leasing in the Arctic would increase oil and gas-related shipping, adding to the risks already being experienced in the Arctic by marine shipping.[24] BOEM's acknowledgement of the high risk of major oil spills in Arctic waters thus raises fundamental questions about the harm BOEM is willing to accept to the environment, local communities and the United States to advance a drilling program in U.S. Arctic waters. BOEM must clearly acknowledge its willingness to accept this trade off, and explain why it is willing to accept it.

In conclusion, BOEM should utilize the best industry modeling and available scientific and technical information to ensure a full analysis of the risks of oil spills from oil and gas activities in America's Arctic waters. To date, it has not done so. Further, BOEM also has a responsibility

[19] Despite mentioning persistence of hydrocarbons as an issue, BOEM fails to conduct any analysis about the transport and fate in the water column. Draft Second SEIS, Volume 2 at A-27.
[20] WWF has suggested to BOEM in the past that areas such as the Hanna Shoal, Herald Shoal, Chukchi Corridor coastal buffer, and Barrow Canyon Complex should be excluded from leasing due to the sensitivity of these habitats. See, e.g., WWF Comments, Call for Information and Nominations, Proposed Chukchi Sea Lease Sale 237 (Dec. 3, 2013), *available at* http://www.regulations.gov/#!documentDetail;D=BOEM-2013-0015-0027 and http://www.regulations.gov/#!documentDetail;D=BOEM-2013-0015-0028.
[21] For example, the draft Second SEIS estimates a 75% chance of a large oil spill occurring during the production life of oil resources from the leases. Draft Second SEIS, Volume 1 at 154.
[22] *See generally Not So Fast: Some Progress in Spill Response, but US Still Ill-Prepared for Arctic Offshore Development*, WORLD WILDLIFE FUND (Dec. 2009), *available at* http://assets.worldwildlife.org/publications/401/files/original/Not_So_Fast_Some_Progress_in_Spill_Response_but_US_Still_Unprepared_for_Arctic_Offshore_Development.pdf?1345754373; PEW ENV'T GRP., *Oil Spill Prevention and Response in the U.U. Arctic Ocean: Unexamined Risks, Unacceptable Consequences* (Nov. 2010), *available at* http://www.pewtrusts.org/~/media/legacy/uploadedfiles/peg/publications/report/Oil20Spill20Preventionpdf.pdf.
[23] *Experts say U.S. needs to improve Arctic infrastructure*, THE ARCTIC SOUNDER (July 27, 2012, 4:38 PM), http://www.thearcticsounder.com/article/1130experts_say_us_needs_to_improve_arctic (quoting Senator Mark Begich).
[24] *See e.g.*, ARCTIC COUNCIL, *Arctic Marine Shipping Assessment 2009 Report* (2009), *available at* http://www.arctic.noaa.gov/detect/documents/AMSA_2009_Report_2nd_print.pdf.

to clearly state why such oil and gas activities in America's Arctic are worth the likely harm to the environment and the people of the United States.

Sincerely,

Margaret Williams
Managing Director
WWF US Arctic Field Program

Enclosures

1. Report prepared for WWF by Applied Science Associates, *SIMAP Modeling of Hypothetical Oil Spills in the Beaufort Sea* (April 2014).
2. WWF, *Factsheet—Modeling Oil Spills in the Beaufort, Bering and Barents Seas* (2014).

Arctic

Modeling Oil Spills in the Beaufort, Bering and Barents Seas

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An Inuk hunter on a snowmobile observing an icebreaker, Canada.

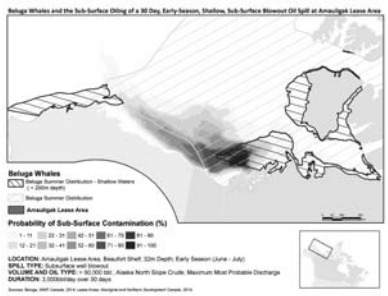
In three separate oil spill modeling exercises, WWF has illustrated the potentially damaging trajectory of oil spills in the Arctic. These modeling exercises prompted the following recommendations. These recommendations cover best practices, protocols, and strategies needed to reduce the risk of oil spills and increase oil spill response capacity across the Arctic Marine and Coastal environments.

Changes in the Arctic sea ice are opening previously inaccessible areas to industrial activity, from natural resources development to increasing shipping. The United States Geological Survey (2008) estimates that up to 22% of the world´s undiscovered technically recoverable oil and gas resources are located in the Arctic, including 13% of the world´s undiscovered oil. More than three-quarters of these resources are to be found offshore in the territories of the five coastal states of the Arctic Sea – namely, the U.S., Canada, Russia, Norway and Greenland. In 2013, 71 ships carried 1.35 million tons of goods through Russia's Northern Sea Route, with oil products making up 67 percent of the cargo. In contrast, 46 vessels with 1.26 million tons of cargo traveled the route the year before.

This expansion in offshore oil and gas and shipping activity is taking place in the absence of proven technologies to clean up a major spill in ice covered waters, putting in jeopardy the livelihoods of people around the Arctic, and jeopardizing already stressed ecosystems.

MODELING OIL SPILLS - LESSONS LEARNT

Beaufort Sea



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WWF-Canada's study on oil spill trajectory modeling in the Beaufort Sea modeled a range of spills of different sources and volumes, at different times of year, resulting in a total of 22 spill scenarios mapped. The research was done by RPS Applied Science Associates (ASA), a world leader in modeling the transport, fate, and biological effects of oil and chemical pollutants in marine environments.

RPS-ASA estimated the spread and fate of potential oil spills associated with increased shipping and tanker traffic, and both shallow-water blowouts and deep-water blowouts in the Canadian Beaufort Sea. Spill scenarios were researched and developed to be as realistic as possible, based on proposed and existing developments (shipping traffic, oil & gas lease sites), and determined in consultation with Inuvialuit communities. Worst-case and most-probable scenarios were modeled. Scenarios accounted for seasonal specifics and sea ice conditions. In the blowout option, the effects of dispersant application were also considered in the oil trajectory. The report also mapped the spread of the spills, their potential impact on the water and shoreline, and the potential interaction with the sea ice, wildlife and ecologically significant areas in the region. The results of this study are presented in an interactive website (arcticspills.wwf.ca) and have been presented in person to all six Inuvialuit communities in the Beaufort Sea region.

LEARN MORE

FULL RESEARCH RESULTS
panda.org/arctic/spillreport

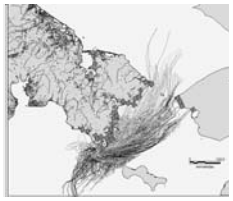
SUMMARY
panda.org/arctic/spillsummary

INTERACTIVE MAP
arcticspills.wwf.ca

LESSONS LEARNT FROM BEAUFORT OIL SPILL MODELING STUDIES

- **Oil and ice don't mix: oil is difficult to contain, especially in icy conditions**
  Spilled oil surfaces rapidly and is easily trapped in sea ice, making it difficult to contain or clean up and spreading oil to areas far from the spill site. In particular, spilled oil may travel considerable distances to the west and north of the spill site when trapped and drifting within sea ice, affecting habitat for a wide range of marine species. As a result of this spread of oil, coastal oiling could be international issue – there may be a relatively high chance that oil spilled in Canadian waters could reach U.S. shorelines and affect communities there, as well as those in Canada.
- **When clean isn't clean: spill response measures come with their own risks**
  Use of chemical dispersants at deep water blowout sites may create 'toxic plumes' of chemical residue to concentrate along the Beaufort shelf, an area that is home to a diverse range of species and essential to the health and productivity of Beaufort Sea ecosystem.
- **Local indigenous knowledge provides valuable insight into local and historical environmental and oceanographic conditions**
  Opportunities to include this in modeling and spill response planning should be explored.

Bering Sea



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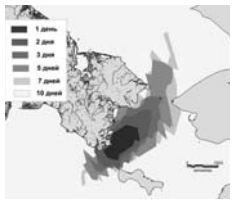
Integrated family of oil spill propagation trajectories after 10 days, for 12 years for the month of August (middle of the navigation period), showing entire northern and western parts of the Chirikov basin as affected by pollution. In some years the oil slick could be transported into the Chukchi Sea. Pollution may impair the whole eastern coast of the natural reserve between Capes Chukotsky and Dezhnev. In individual years the oil slick could reach as far as the Seward Peninsula (Alaska).



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An integrated family of 10-days oil spill propagation trajectories from a specified point in a specified month (August) over 12 years, showing a 50% likelihood of the oil slick crossing the U.S.-Russia border in the central part of the Chirikov basin, within 2-3 days of the spill.

This research, led by WWF-Russia and WWF-US, modeled spills for the Bering Strait region from oil tankers and cargo ships already travelling along Russia's Northern Sea Route and through the Bering Strait, at specified points along the official recommended shipping route during the navigational season (May-November). The research was done by Risk Informatics Research Center, Russian experts in risk assessments, oil spill modeling, design plans and maintenance documentation for oil and gas projects in marine environments, and expert evaluations of safety for such projects.

Risk Informatics Research Center estimated the risk of current and near-future oil spill risk, and the spread and fate of potential oil spills from shipping sources in the Bering Strait, with a total of 36 oil spill scenarios mapped. More than 6,500 calculations of oil spill trajectories were made with real data for a 12-year period. Scenarios considered seasonal specifics, local hydrology, ice conditions, and other environmental conditions that affect oil spill behavior and ship accident incident rates. Discharge volumes were based on a review of vessel types and associated fuel carrying capacities that either currently operate along the Northern Sea Route and in the Bering Strait, or are purposed for future operation in the area. Worst-case scenarios were modeled. The three selected points of oil discharge were intended to take account of the variety of hydrometeorological, hydrological, and ice conditions in the Bering Strait to the largest degree possible. Selected scenarios from this study are presented in an interactive website (projects.scanex.ru/RussianArcticMSP-BStraitEng) and have been presented in person to audiences in Moscow, Washington DC, and Anchorage, Alaska.

LEARN MORE

FULL RESEARCH RESULTS
wwf.ru/about/what_we_do/oil/full_list/arctic/eng

INTERACTIVE MAP AT
projects.scanex.ru/RussianArcticMSP-BStraitEng

LESSONS LEARNT FROM BERING OIL SPILL MODELING STUDIES

- **Increasing transport of oil and gas through the Bering Strait threatens protected territory of the Beringia National Park**
- **An oil spill on the Russian side of the Bering Strait has a high probability of crossing to the US waters, affecting the entire ecosystem**
- **Prevention and response systems in the Bering Strait are either missing or are inadequate**
- **US-Russia transboundary collaboration and knowledge sharing is needed to support planning, preparedness, risk reduction, and incident response**
- **Navigational safety measures are necessary to minimize risks of vessel accidents**

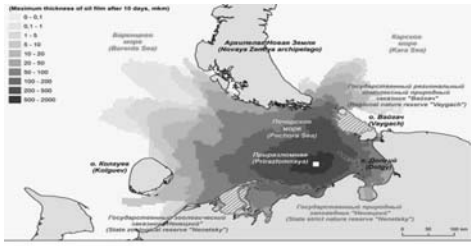
Barents Sea

LEARN MORE

FULL RESEARCH RESULTS
wwf.ru/resources/publ/book/eng/770

The purpose of this WWF-Russia led research (2012) was to assess capabilities and adequacy of emergency response related to the potential oil spills from operation of Gazprom Neft oil platform Prirazlomnaya in the Russian sector of the Barents Sea. The research was also done by Russian experts from the Risk Informatics Research Center (Moscow, Russia).

Scenarios considered the potential volume of spilled oil, hydro-meteorological conditions during the accident (strength and direction of wind, currents, wave height, ice conditions), as well as actions planned by the company to manage the spill. The maximum amount of the spill was calculated according to official regulations, 1,500 tons for wells and 10,000 tons for tankers. The study identified conditions and situations that may hinder oil spill clean-up capability, and took into account official regulations and requirements related to oil spill prevention and response. Research results showed significant shortcomings in Gazprom Neft's oil spill response plan, including inadequate equipment for response in Arctic conditions. The study was shared with the company, which agreed that the pointed-out shortcomings were serious, and was widely shared in Russia. Thereafter the company reported some improvements (including additional response vessel and equipment involvement, establishment of co-operative mutual aid agreement with other operators, and reassessment of oil spill modeling).



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Potential oil pollution of seawater and shoreline after oil spill of 10,000 t over 5 days.

LESSONS LEARNT FROM BARENTS OIL SPILL MODELING STUDY

- **Gazprom Neft, operator of the oil platform Prirazlomnaya, needs to strengthen its oil spill response capability in the Arctic**
- **In case of response failure due to harsh environmental conditions, an oil spill could lead to serious pollution of this fragile region**
- **Potential impacts of oil spills in the southeastern Barents Sea will negatively affect endangered species habitat (Atlantic walrus) and important protected areas including shores of the Nenets zapovednik.**

WWF RECOMMENDATIONS

1. Increased investment in knowledge generation and monitoring

The best available environmental and socio-ecological data is needed to model and predict the fate and trajectory of oil spills in the Arctic and support rigorous vulnerability analyses and risk assessments. Arctic states should continue efforts to close the knowledge gap in biodiversity and socio-ecological parameters (i.e. spatial and temporal species distribution, ice-associated habitats, feeding areas, subsistence use areas, and other knowledge gaps identified in the ABA Synthesis 2013); improve real time monitoring of environmental (i.e. weather, sea-ice and oceanography) and ecological conditions; and on-going investments in the improvement of oil-in-ice modeling methodologies and current-ice coupled models.

Furthermore, WWF encourages that CAFF develop actions to close the knowledge gap in biodiversity parameters by further building on the Circumpolar Biodiversity Monitoring Program (CBMP) and the Arctic Biodiversity Data Service (ABDS) as providing a source of data for modeling and ecosystem-based management. Data collection should include community-based monitoring and local and traditional knowledge, which provide valuable insight into the local and historical environmental and ecological conditions.

2. Implementing an ecosystem approach at national and eco-region scales

Transboundary collaboration and knowledge sharing is essential to support planning, preparedness, and risk reduction prior to increased development. As entire ecosystems would be affected by marine oil spills, implementation of an ecosystem approach (as under-development by the PAME Expert Working Group), in collaboration and cooperation from nations across eco-regions, is necessary to prepare and plan for oil spill impacts. As one step to advance an ecosystem approach, WWF recommends that Arctic countries establish and enhance eco-region specific databases to actively share relevant data on environmental, ecological and human activity, and prioritize and fund research to further collect and compile such data at an ecosystem scale.

3. Mandatory oil spill modeling

Oil spill modeling should be mandatory for regions of existing and new oil development and for waterways where oil is currently being transported or where such transport is being planned. Implementation of such models is especially important in transboundary regions. WWF recommends that all applications for oil and gas exploratory drilling and proposed shipping corridors be accompanied by 3rd party oil spill trajectory modeling in a range of scenarios (most probable spills, worst case spills and other important scenarios). Models should include spill scenarios that may occur both during and beyond operating seasons. These scenarios should also include vulnerability analyses, and identification of critical habitats and subsistence use areas. Relevant ministries should mandate and/or support the modeling at a national level, to be performed by the most-qualified third parties. Results should be shared with neighboring countries in order to inform effective joint prevention and response measures.

WWF recommends that EPPR encourage rigorous oil spill trajectory modeling exercises in areas of proposed and existing shipping and oil and gas activities, and use the results of regional and trans-boundary oil spill modeling to define further prevention and response projects and actions involving Permanent Participants and Observers.

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Belugas, Chukchi Sea.

4. Environmental risk assessments

The Arctic countries should require comprehensive environmental risk assessments prior to issuing new exploratory drilling licenses in the Arctic and in consideration of the full life-cycle risks of these developments (including exploration, production, and transportation). Such risk assessments should be conducted in a transparent manner with participation by all relevant stakeholders. WWF recommends that in upcoming projects, including the Circumpolar Oil Spill Response Gap Analysis and the Circumpolar Marine Environmental Risk Assessment, EPPR should assess response gaps and environmental risks on a Circum-Arctic basis to inform spatial and temporal measures to reduce disturbance to significant areas from oil and gas and shipping activities.

5. Implementing appropriate spatial and temporal measures to reduce disturbance to significant areas

Arctic States should continue the on-going identification and mapping of ecologically and culturally significant areas and pursue further work to determine the vulnerability of areas to oil spills under different scenarios. Ecosystem features, habitats, and subsistence use areas that are deemed too valuable and vulnerable to oil spills should be identified and agreed upon by national agencies, industry and regional communities. Special measures for response (i.e. response infrastructure nearby, seasonal considerations in response options), and development limitations (such as safeguarding, zoning, shipping lane designations, or deferral areas) should be implemented in oceans planning and leasing decisions at national and ecosystem scales.

6. Improving oil spill response capacity and coordination

As the AMSA (2009) emphasized, there is a lack of emergency response capacity for saving lives and for pollution mitigation in the Arctic, except in limited areas, which makes emergency response significantly more difficult. The report on Responding to Oil Spills in U.S. Marine Environments (2014) by the U.S. National Research Council confirmed that the lack of infrastructure and oil spill response equipment in the U.S. Arctic is a significant liability in the event of a large oil spill. This report also noted that many aspects of the Arctic environment which are still poorly understood, including the presence of sea ice, can influence the behavior of spilled oil, yet most spill response technologies were designed for and tested in temperate regions.

For regions where risk assessments and oil spill modeling forecasts show a high risk and likelihood of transboundary oil spills, transboundary cooperation on oil spill preparedness and response, pursuant to the recent Agreement on Cooperation on Marine Oil Pollution, Preparedness and Response in the Arctic (2013), needs to be strengthened. WWF recommends that Arctic countries immediately begin to implement this Agreement and strengthen the implementation by developing joint oil spill models for transboundary regions, and by conducting joint preparedness and response exercises and drills, especially in the Bering, Beaufort, and Chukchi Seas shared by Arctic Council states.

Prior to increased exploration, production, and transportation of oil in the Arctic, claims that adequate oil spill response technologies exist for Arctic conditions (across seasons, in both open and ice-infested waters) must be verified. Adequacy and effectiveness should be assessed by a committee of regulators and community stakeholder representatives. WWF recommends that the Arctic Council Ministers task EPPR with enhancing Arctic oil spill response capability, by coordinating and conducting simulation and training exercises in cooperation with national governments, including an after-action report with recommendations improving oil spill response coordination in the Arctic. WWF specifically recommends that the U.S. lead such an exercise to test technology to combat oil spill in ice conditions including mechanical recovery, in-situ burning and use of dispersants or other countermeasures, including information on the operational benefits and limits associated with the use of these tactics to enhance implementation of the 2013 Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic. The joint exercises should also address the practical challenges of transporting and deploying response equipment and responders to spill locations.

Furthermore, WWF supports efforts to provide guidance to small communities on best practices related to prevention, preparedness and response to oil spills in the Arctic and increased capacity-building of regional and local of communities to respond to oil spills.

CONCLUDING RECOMMENDATIONS

During its two-year chairmanship of the Arctic Council, the United States should lead a process to ensure that agreed recommendations are implemented at a national (and where necessary, international) level, and that the level of implementation is monitored by each state, and reported back to the Council every two years.

Such a process should include the development of plans for all policy recommendations that outline specific methodologies, processes, timelines, milestones and approaches for implementation of the many working group recommendations. It should also include not just commitments to research, but concrete actions on some of the already well-researched recommendations of the CAFF Arctic Biodiversity Assessment.

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Information

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Corporations and Industry Groups

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Submitted electronically via regulations.gov

Re: Docket No. BOEM-2014-0078

Dear Sirs:

The Alaska Oil and Gas Association (AOGA) appreciates the opportunity to provide the following comments regarding the Bureau of Ocean Energy Management's (BOEM) Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Lease Sale 193. AOGA is a professional trade association whose 14 members account for the majority of oil and gas exploration, development, production, transportation, and refining activities onshore and offshore in Alaska. AOGA's members remain devoted to the prudent and environmentally conscious development of Alaska's energy resources. As relevant here, several of AOGA's members are actively involved in oil and gas exploration and development in the Alaskan Arctic OCS and are relying upon the efficient and timely finalization of Lease Sale 193.

I. Oil and Gas Development in the Arctic OCS is Crucial to Alaska and the United States

As an initial matter, the Alaskan Arctic OCS possesses enormous untapped oil and gas resources. Specifically, the Chukchi Sea offers greater resource potential than any other currently undeveloped energy basin in the United States, and there are few regions in the world that offer greater potential. The Department of Interior estimates that the Alaskan Arctic OCS contains approximately 27 billion barrels of oil and 132 trillion cubic feet of natural gas. To provide further context, the Alaskan Arctic OCS would constitute the 8th largest oil resource in the world, ahead of Nigeria, Libya, Russia and Norway.

These untapped resources are of critical importance to both Alaska and the United States. Oil and Gas development in the Arctic OCS is predicted to produce an annual average of 35,000 direct and indirect jobs over the next half-century for Alaska alone. Those jobs would represent a total payroll of over $70 billion. Furthermore, the economic activity resulting from Arctic OCS development is also predicted to generate an annual average of nearly 55,000 jobs nationwide, with an estimated cumulative payroll amounting to $145 billion over the same time period. From an economic standpoint alone, promoting and fostering Arctic OCS development would result in a windfall for the national economy. Indeed, in 2008, Lease Sale 193 netted the federal government greater than $2.6 billion in bonus bids, and, moving forward, revenues generated from Arctic OCS oil and natural gas exploration and development could amount to nearly $200 billion in revenues to federal, state and local governments.

Offshore development would also serve to help maintain the integrity of the Trans Alaskan Pipeline System (TAPS), a critical link to America's energy distribution. TAPS, which stretches from Prudhoe Bay to the port of Valdez, has transported more than 17 billion barrels of oil since it came online over 35 years ago. Twenty-five years ago, oil production derived from Alaska's North Slope exceeded two million barrels a day, filling TAPS and providing approximately a quarter of this nation's domestic crude oil. However, the quantity of oil produced in Alaska has steadily declined, with TAPS currently transporting approximately 500,000 barrels per day. Given the vast resources available in the Arctic OCS, future production could effectively stem the tide, allowing for TAPS to remain viable for decades. In that vein, OCS development would also serve as an important factor in reducing risks for the proposed natural gas pipeline from the North Slope to Lower 48 markets.

Perhaps most importantly, oil and gas development in the Arctic OCS could ultimately prove indispensable, given forecasts that predict this nation's energy demands increasing over ten percent in the next quarter-century. Even with dramatic increases in alternative energy sources, the majority of these growing energy demands will continue to be

satisfied by oil and natural gas. It remains imperative that this nation meet its growing energy demands through domestic production. In addition to the economic benefits previously articulated, there may be no greater tangible benefit to Arctic OCS development than increased energy independence.

II. Comments on the Draft SEIS

AOGA appreciates BOEM's reliance in the Draft SEIS on previously produced NEPA documents to support the contemplated activities associated with Lease Sale 193. In doing so, BOEM appropriately and effectively allows for a focused examination on those aspects of the Draft SEIS that are new or altered from the agency's previous analyses. In this SEIS, BOEM has identified and incorporated numerous environmental studies and scientific papers, which serve to support those discussions related to environmental effects. Although AOGA supports BOEM's thorough approach, it would suggest that BOEM provide further detail regarding the significance of these studies, particularly the manner in which the scientific research cited supports BOEM's conclusions.

Given the lengthy and complicated process that has given rise to a second SEIS for Lease Sale 193, AOGA would recommend that BOEM clearly articulate whether the agency intends to restate its previous analyses or simply summarize earlier data and conclusions in supporting a focused discussion on new information. To this end, BOEM could also provide a list of those documents the agency intends to tier to or incorporate by reference.

Additionally, AOGA believes that BOEM could improve the SEIS by providing a more thorough explanation regarding the analytical framework BOEM used, as well as its corresponding scientific conclusions. For example, AOGA would recommend BOEM enhance the articulation and explanation associated with the "impacts scale" criteria and "significance" threshold provided in Section 4.2, while also providing a more concrete link between its environmental impacts analysis and conclusions to the scales adopted. This example is of particular importance given the detailed, resource-specific impacts scale criteria that BOEM and other agencies have adopted in comparable NEPA analyses. Furthermore, while the substantive conclusions will likely differ, AOGA would suggest BOEM articulate impact analysis conclusions consistently throughout a given section to improve clarity.

As it relates to air quality concerns and regulations, AOGA would encourage BOEM to include in its Final SEIS a more thorough discussion regarding the implications of Congress's recent decision to shift OCS air quality regulation authority to BOEM from the U.S. Environmental Protection Agency (EPA). The 2007 EIS and 2011 SEIS anticipated EPA jurisdiction over sources of air emissions in the Arctic OCS, and, accordingly, BOEM deferred to the EPA the NEPA air quality analysis. AOGA believes

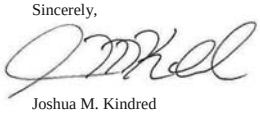
that the jurisdictional change merits a detailed discussion in the Final SEIS that explains the manner in which BOEM will regulate air quality emissions and the corresponding NEPA analysis implications.

Finally, AOGA encourages BOEM to include a more thorough discussion regarding mitigation measures. Specifically, AOGA believes it would be beneficial for BOEM to articulate those mitigation measures that are currently in place as well as those measures' anticipated impacts. BOEM should also include an explanation supporting its conclusions that additional mitigation is not necessary. It would be beneficial for BOEM to provide an explanation relating to the applicability of mitigation measures detailed in its prior NEPA analyses, and how those mitigation efforts would serve to minimize potential adverse environmental effects resulting from the revised exploration and development scenarios. AOGA believes that the existing mitigation measures provide appropriate protection for this stage of the process set forth in the Outer Continental Shelf Lands Act, a conclusion that would be strengthened through greater detail in the Final SEIS.

III. Conclusion

Thank you for allowing AOGA to provide these comments. AOGA is encouraged by the quality and breadth of BOEM's Draft Second SEIS and appreciates BOEM's efforts to complete the SEIS in a thorough and timely manner. It is in Alaska and this nation's best interest that BOEM continue this process in an efficient manner and finalize Lease Sale 193 as soon as possible. Should you have any questions please contact Joshua Kindred at 907-222-9604 or kindred@aoga.org.

Sincerely,



Joshua M. Kindred
Regulatory and Legal Affairs Manager
Alaska Oil & Gas Association

Representation of Consumer Energy Alliance Submittal | Document too voluminous to include in SEIS | All comments reviewed and considered

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0157
Comment from David Holt, Consumer Energy Alliance

Submitter Information

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Phone: 713-337-8800
Organization: Consumer Energy Alliance

General Comment

Please find attached a petition signed by 75,006 people who support Alaskan OCS development and are urging the BOEM to move forward with Lease Sale 193.

Attachments

75,006 Signatures on Petition for LS 193

Representation of Consumer Energy Alliance Submittal | Document too voluminous to include in SEIS | All comments reviewed and considered

CONSUMER ENERGY ALLIANCE
THE VOICE OF THE ENERGY CONSUMER

December 18, 2014

Michael Routhier
Program Analysis Officer and Project Manager
Bureau of Ocean Energy Management, Alaska OCS Region
3801 Centerpoint Drive Ste. 500
Anchorage AK 99503-5820

Re: Support for Chukchi Lease Sale 193

Dear Mr. Routhier:

Consumer Energy Alliance (CEA) is delivering the below petition signed by **75,006 U.S. residents** who support Chukchi Lease Sale 193 and Alaskan offshore drilling and are urging the Bureau of Ocean Energy Management to affirm Lease Sale 193 swiftly.

I am writing to demonstrate my support for oil and gas development in the Alaskan Outer Continental Shelf (OCS) and urge the Bureau of Ocean Energy Management (BOEM) to finalize swiftly the Draft Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. I believe that using all of our domestic energy resources, including those in the Chukchi Sea, is essential to meeting our consumer needs with domestic supplies and strengthening our nation's energy security.

Offshore oil and gas development in the Chukchi Sea has the potential to help the United States meet its energy demand, create jobs and grow the economy. Affirming Lease Sale 193 is in the best interest of all Americans. There has been ample opportunity for environmental review and public input on Lease Sale 193. Therefore, upon conclusion of this public comment period, I urge BOEM to move forward so that Americans can reap the economic and energy security benefits of Alaska's OCS.

Please contact Consumer Energy Alliance at 713-337-8800 with any questions.

Sincerely,

Dean Aanerud Wasilla, Ak 99654	Chris Abell 3490 Harlequin Ct Kodiak, Ak 99615	Patrick Abood 4720 Golden Spring Cir Anchorage, Ak 99507
Michael Acheson 1612 Otter St Anchorage, Ak 99504	K Adams 423 Farewell Ave Fairbanks, Ak 99701	Mary Adams Wasilla, Ak 99654
Todd Adams Nenana, Ak 99760	Dan Adams Delta Junction, Ak 99737	Mary Ahkivgak Barrow, Ak 99723
A Akers 2415 Hemlock Ave Ketchikan, Ak 99901	Scot Akers Homer, Ak 99603	Bruce Alborn 3903 Jennifer Pl Homer, Ak 99603

Representative of Consumer Energy Alliance Submittal | Document too voluminous to include in SEIS | All comments reviewed and considered

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0170
Comment from David Holt, Consumer Energy Alliance

Submitter Information

Name: David Holt
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Email: dholt@consumerenergyalliance.org
Phone: 713-337-8800
Organization: Consumer Energy Alliance

General Comment

Please find attached petitions signed by 25,027 U.S. citizens in support of Alaskan OCS development and the affirmation of Lease Sale 193. Please contact Consumer Energy Alliance with any questions.

Attachments

2996 Signatures on a Petition for LS 193

22,031 Signatures on a Petition for LS 193

Representative of Consumer Energy Alliance Submittal | Document too voluminous to include in SEIS | All comments reviewed and considered

CONSUMER ENERGY ALLIANCE
THE VOICE OF THE ENERGY CONSUMER

December 19, 2014

Michael Routhier
Program Analysis Officer and Project Manager
Bureau of Ocean Energy Management, Alaska OCS Region
3801 Centerpoint Drive Ste. 500
Anchorage AK 99503-5820

Re: Support for Chukchi Lease Sale 193

Dear Mr. Routhier:

Consumer Energy Alliance (CEA) is delivering the below petition signed by **2,996** U.S. residents who support Chukchi Lease Sale 193 and Alaskan offshore drilling and are urging the Bureau of Ocean Energy Management to affirm Lease Sale 193 swiftly.

I am writing to demonstrate my support for oil and gas development in the Alaskan Outer Continental Shelf (OCS) and urge the Bureau of Ocean Energy Management (BOEM) to finalize swiftly the Draft Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193. I believe that using all of our domestic energy resources, including those in the Chukchi Sea, is essential to meeting our consumer needs with domestic supplies and strengthening our nation's energy security.

Offshore oil and gas development in the Chukchi Sea has the potential to help the United States meet its energy demand, create jobs and grow the economy. Affirming Lease Sale 193 is in the best interest of all Americans. There has been ample opportunity for environmental review and public input on Lease Sale 193. Therefore, upon conclusion of this public comment period, I urge BOEM to move forward so that Americans can reap the economic and energy security benefits of Alaska's OCS.

Please contact Consumer Energy Alliance at 713-337-8800 with any questions.

Sincerely,

Larry Richardson 13321 Abb Rd Mcintosh, Al 36619	Barbara Jone Po Box 295 Valparaiso, Al 32580	Tony Getto 49 Lone Oak Dr. Weaver, Al 36277
Janette Scott 107 Nascar Drive Lincoln, Alabama 35096	Michael Moultis 916 County Road 25 Scottsboro, Alabama 35768	Daphanie Mcclure 141 Mangrove Dr Alabaster, Alabama 35007
Robert Farrar 1896 County Road 69 Centre, Alabama 35960	Toby Pedersen 112 Rock Creek Dr Morrilton, Ar 72110	George Adkins 101 West First Street Gentry, Ar 72734
Helen Giles 14974 W. Winged Foot Ct. Surprise, Arizona 85374	Katherine Black 3402 E Roma Ave Phoenix, Arizona 85018	Samuel Sierra 6315 N. 16th St. #122 Phoenix, Arizona 85016

ConocoPhillips Alaska

Michael J. Faust
Vice President
Alaska Exploration and Land

P. O. Box 100360
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December 22, 2014

Federal eRulemaking Portal: http://www.regulations.gov

Bureau of Ocean Energy Management (BOEM)
Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823
Attn: Michael Routhier, Program Analysis Officer and Project Manager

Re: BOEM-2014-0078 - Draft Second Supplemental Environmental Impact Statement for the Chukchi Sea Planning Area, OCS Oil and Gas Lease Sale 193 (OCS EIS/EA BOEM 2014-653) - Comments of ConocoPhillips Alaska, Inc.

Dear Sir:

This letter provides the written public comments of ConocoPhillips Company ("ConocoPhillips") on the Draft Second Supplemental Environmental Impact Statement ("DSSEIS") for OCS Oil and Gas Lease Sale 193 in the Chukchi Sea ("Lease Sale 193") (OCS EIS/EA BOEM 2014-653). ConocoPhillips' comments are being submitted pursuant to the Federal Register notice issued by the Bureau of Ocean Energy Management ("BOEM") on November 7, 2014. *See* 79 Fed. Reg. 66401-402. ConocoPhillips also supports the comments submitted in this matter by the American Petroleum Institute.

I. GENERAL COMMENTS

Overall, ConocoPhillips commends BOEM for the high quality of the DSSEIS and the transparency of its analysis. ConocoPhillips generally concurs in the alternatives selection and discussion, and the scope of both the impact factors and the cumulative impacts analyses. Based upon the DSSEIS, ConocoPhillips urges BOEM to finalize the SSEIS and to, yet again, reaffirm Lease Sale 193.

More broadly, ConocoPhillips observes that the ongoing NEPA process and litigation associated with Lease Sale 193, and the attendant expense, diversion of public and private resources, and uncertainty, provides an example of how implementation of

BOEM-2014-0078-0253

NEPA is failing to serve the purposes Congress intended. The original final EIS for Lease Sale 193 was completed in June 2007, and Lease Sale 193 was subsequently conducted in early 2008. We are well on the way to the 8th anniversary of the final EIS, and yet Lease Sale 193 remains uncertain, bogged down in serial NEPA process, and dependent upon the outcome of continuing litigation. Despite the investment of billions of dollars by leaseholders, there has yet to be a single exploration well drilled into a potential hydrocarbon bearing zone pursuant to Lease Sale 193.

In light of the litigation that is undermining this process, ConocoPhillips appreciates that the intent of BOEM in preparing the DSSEIS was to ensure it addresses concerns underlying the Ninth Circuit's decision remanding the agency's Lease Sale 193 decision for further NEPA analysis. Presumably, the approach taken does ensure that further judicial review cannot possibly result in a finding that BOEM's analysis short-changed consideration of adverse impacts from hypothetical future development of oil or gas resources (that are presently undiscovered). It is important for us to state, however, that performance of a worst case scenario environmental impact analysis, as was done in this DSSEIS, is neither an informative planning and decision tool, nor a sound precedent for future OCS lease sale NEPA analyses.

It has been well-settled law for decades that NEPA does not mandate a worst case scenario environmental impact analysis. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 354-56 (1989). As the Supreme Court observed in reaching this holding, worst case scenarios do not serve the purpose of NEPA in mandating a "hard look" analysis of the reasonably foreseeable environmental consequences of a proposed action. Instead, a worst case scenario analysis distorts[s] the decision making process by overemphasizing highly speculative harms." *Id.* at 356. Notwithstanding more than 20 years of jurisprudence confirming that a worst case scenario environmental impact analysis is not what NEPA requires, this DSSEIS effectively presents a worst case scenario with respect to hypothetical future development. While we understand the motivation for doing so in response to the remand in this case, we do not support this approach to NEPA compliance generally, and we emphasize the importance of distinguishing clearly between hypothetical worst case scenarios and reasonably foreseeable consequences.

II. SPECIFIC COMMENTS

Because the DSSEIS analyzes the potential impacts of a worst case hypothetical future development scenario, it is uncertain how commenting on specific aspects of the impact analysis may be relevant to a useful analysis of reasonably foreseeable impacts. Nevertheless, the following comments address aspects of the impact analysis that are inaccurate, potentially confusing or seemingly based upon unwarranted speculation.

BOEM-2014-0078-0253

- Bearded seals

The DSSEIS refers to listing of the Beringia bearded seal DPS as "threatened" under the Endangered Species Act ("ESA"); however, that agency decision has been held invalid and vacated. *Compare* DSSEIS at p. 88, *with Alaska Oil and Gas Association v. Pritzker*, 2014 WL 3726121 (D. Alaska July 25, 2014).

- Marine mammal impacts

The terminology used in connection with assessing marine mammal impacts is potentially confusing and should be clarified.

The Marine Mammal Protection Act ("MMPA") provides a statutory structure for permitting the incidental take of small numbers of marine mammals by U.S. citizens engaged in specified activities other than commercial fishing, provided that the authorized take has no more than a "negligible impact." This program is discussed in the DSSEIS in connection with BOEM's explanation for why it decided not to carry forward for further analysis alternatives establishing a Hanna Shoal exclusions zone. *See* DSSEIS at p. 14-15. There, BOEM explains that existing incidental take regulations issued under the MMPA include specific mitigation measures to be employed within the Hanna Shoal Walrus Use Area during times of concentrated walrus use. *Id.* at 15 (citing 50 C.F.R. § 18.118(a)(4)(v)). BOEM concludes both that the likelihood of on-lease activities taking place within Hanna Shoal is very low, and that the existing MMPA regulations and Lease Sale 193 stipulations are sufficient to "ensure that any routine activities conducted pursuant to Lease Sale 193 leases would be conducted in a manner that does not cause more than a 'negligible' impact to marine mammals[.]

Notwithstanding these findings, and notwithstanding similar findings in the section of the DSSEIS addressing potential impacts to walrus, the DSSEIS concludes that impacts to walrus from the extreme development scenario that was analyzed could be "moderate." *See* DSSEIS at p. 291-292. The potential disconnect between a "moderate" impact finding for walrus, the MMPA's requirement for no more than a "negligible" impact, and BOEM's conclusion earlier in the DSSEIS that impacts to walrus will be no more than "negligible" would benefit from further explanation. Among other things that seem evident, the impact analyzed in the DSSEIS is of a hypothetical worst case scenario oil production development, not of an actual set of proposed or anticipated specific activities which would be analyzed for an MMPA take authorization. Indeed, this is an example of how a hypothetical worst case scenario analysis distorts the information presented to the agency and the public by falsely suggesting that the impact analysis informs the expected consequences of the proposed activities.

ConocoPhillips also urges BOEM to carefully review and reconsider its finding that impacts to bowhead whales would be "moderate." *See* DSSEIS at 275-278. First, as indicated above, it bears emphasis that this finding applies to a worst case scenario analysis of a hypothetical development scenario intentionally biased to maximize adverse impacts, not to exploration activities alone or to any other reasonably

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foreseeable routine oil and gas activity in the Chukchi Sea. Second, the "moderate" finding appears to be predicated on "potential" harm to individual whales resulting from vessel traffic (*i.e.* to potential mortality resulting from collisions occurring as a result of an unrealistically compressed development scenario). ConocoPhillips is unaware of any historical or other data substantiating the likelihood of vessel collision mortalities to bowhead whales of a magnitude that would warrant a "moderate" impact finding. To the contrary, this finding appears to be entirely premised upon speculation.

- Archaeological impacts

The DSSEIS finding that the proposed hypothetical development scenario may result in "major" adverse impacts to archaeological resources is unwarranted because it is entirely disproportionate to the significance of potential historic and prehistoric resources in the area. The subject area is extremely remote and largely inaccessible, offshore in the Arctic Ocean and covered by pack ice for most of the year. The majority of archaeological resources believed to occur in the area consist of shipwrecks scattered across a vast area of ocean floor for which there is no current or probable future feasibility or funding to investigate, document or curate. In the absence of detailed data (that is unlikely to ever be obtained), the DSSEIS merely "assumed that effects would be major if any historic or archaeological resource would be adversely affected with no prior mitigation or monitoring in place." *See* DSSEIS at 405. An impact assessment that stacks speculation upon speculation in this manner has no analytical value.

- Chukchi Sea Environmental Studies Program

ConocoPhillips appreciates BOEM's inclusion of new and updated science since the 2011 published SEIS. However, large segments of data acquired by the joint effort Chukchi Sea Environmental Studies Program (CSESP) conducted on behalf of ConocoPhillips and other industry participants were not included in Chapter 3. Specifically, in Section 3.1.8, numerous publications and scientific data on the acoustic environment in the Chukchi Sea failed to be mentioned and should be cited in lieu of outdated information from the 1990's collected in the Beaufort Sea. Additionally, new studies detailing benthic species composition per the CSESP provide valuable data on the existing environment, and these studies were not included in Section 3.2.1 of the DSSEIS. The CSESP has been funded by industry participants specifically for the purpose of providing integrated information for use in environmental impact analysis. It has been a very successful program, the results have been shared with the federal government and the general public, and the results should be included in the DSSEIS.

- Potential future claims

Recent developments, such as the Complaint for Declaratory and Injunctive Relief filed by the Alaska Wilderness League and others on November 10, 2014 in the federal District Court for the District of Columbia, suggest that the next round of litigation regarding NEPA compliance for Lease Sale 193 will shift focus away from the concerns

that led the agency to prepare the DSSEIS, and toward new and different claims. For example, it seems likely that BOEM will next face an argument the that the second supplemental EIS is defective in failing to analyze in detail Hanna Shoal exclusion zone alternatives. For this reason, ConocoPhillips urges BOEM to pay close attention to, and to provide robust responses to, any new eNGO concerns asserted in comments on the DSSEIS, particularly those pertaining to Hanna Shoal.

In conclusion, ConocoPhillips appreciates BOEM's continuing efforts to navigate and to complete the NEPA process for its 2008 Lease Sale 193 in the Chukchi Sea. Thank you for considering these comments on the DSSEIS. Please do not hesitate to contact the undersigned if you have any questions.

Sincerely,

Michael J. Faust
Vice President
Alaska Exploration and Land
ConocoPhillips Alaska

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Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0259
Comment from Marty Awalin, Cully Corporation

Submitter Information

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Organization: Cully Corporation

General Comment

See attached file(s)

Attachments

2014-12-22 Cully Corp. Public Comments

Attachment A - Dushane Presentation - Response Plan Overview 2014

Attachment B - Cully Biological Assessment

P.O. Box 59089
Point Lay, AK 99759
Phone: (907) 833-2705
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December 22, 2014

VIA FEDERAL eRULEMAKING PORTAL

Public Comments Processing
Attn: Docket No. BOEM-2014-0078

Mr. Walter Cruickshank
Acting Director, Bureau of Ocean Energy Management
Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, AK 99503-5823

Re: Chukchi Sea Planning Area, Oil and Gas Lease Sale 193, Draft Second Supplemental Environmental Impact Statement

Dear Mr. Cruickshank:

The Cully Corporation (Cully) appreciates the opportunity to comment on the Draft Second Supplemental Environmental Impact Statement (Draft Second SEIS). The Draft Second SEIS maintains an ambiguity regarding Lease Stipulation 7 that has existed since the leases were originally issued in 2008. That ambiguity is now adversely affecting Cully's ability to pursue opportunities on behalf of its shareholders. Cully submits this comment letter to identify the problem and request that BOEM clarify the issue in the Final Second SEIS.

I. Cully's Proposed Oil Spill Response and Support Services Program

Cully was organized under the Alaska Native Claims Settlement Act and is the Alaska Native Corporation for the village of Point Lay. Cully's mission is to provide "a diversified field of professional services under its construction and services companies" that contributes to the overall well-being of its shareholders while simultaneously respecting our Iñupiaq heritage. The Chukchi Sea is integral to our way of life. Our village hunters harvest bowhead and beluga whales, seals, walrus, caribous, and various fish.

Point Lay is located in Kasegaluk Lagoon on the Chukchi Sea coastline. It is the closest settlement to several leases sold in Lease Sale 193, including ConocoPhillips's (CPAI's) Devils Paw Prospect. Cully wishes to provide support services for CPAI, including an oil spill response (OSR) program designed to protect the natural resources which the Point Lay community harvests and depends on. This opportunity presents both environmental and economic benefits for Point Lay.

First, an OSR program based in Point Lay[1] would allow us to take an active role in ensuring that appropriate response assets and personnel are on-site and prepared to respond to protect the natural resources we depend on in Kasegaluk Lagoon and Ledyard Bay in the unlikely event of an oil spill. Because of our subsistence lifestyle, we are dependent on our ecosystem and uniquely qualified to identify and protect sensitive resources in the event of a spill.

Second, an OSR program would provide an important economic opportunity for our community. This significance of this economic opportunity for the Point Lay community is not speculative. The communities of Barrow and Wainright has benefited from just this type of enterprise since 2009. Ukpeagvik Inupiat Corporation and Olgoonik, the ANCSA Native Village Corporation for Barrow and Wainright, secured several contracts that enabled the construction of a spill response center, training and employment for both local residents, a modern camp to house workers and improved logistics facilities to support all aspects of the exploration programs.[2]

Such an OSR program would require vessel travel through Ledyard Bay between Point Lay and the Devils Paw Prospect during the open water season. Were a spill to occur, we would need to transport response assets to and from Point Lay via the Ledyard Bay and Kasegaluk Lagoon. To ensure proper readiness, we would also need to conduct training exercises within these areas. A broader support program may involve other transit between the Devils Paw Prospect and Point Lay.

II. Lease Sale Stipulation No. 7 Is Ambiguous.

Cully's ability to pursue an OSR program has been limited because of uncertainty regarding the restrictions imposed by Stipulation No. 7 to the Chukchi Sea OCS leases sold in Lease Sale 193. Stipulation No. 7(A)(2)(b) prohibits "surface vessels associated with exploration and delineation operations" from entering the Ledyard Bay Critical Habitat Unit (LBCHU) during the open water season (July 1 through November 15) except for "emergencies or human/navigation safety," in which case, vessel travel in the LBCHU must be reported to BOEM within 24 hours.[3] The stipulation does not define the term "surface vessels associated with exploration and delineation operations," and it is unclear whether BOEM would interpret the stipulation to prohibit vessels operated by a lessee's contractors from traveling through the LBCHU.

[1] Cully has recently acquired titled to Cape Sabine, a former Navy Defense Early Warning Station, and is considering using that location as an alternate base for operations. The impact of Lease Sale Stipulation No. 7 is the same regardless of whether the operations are staged out of Cape Sabine or Point Lay.

[2] *See Offshore development brings 'life-and-death issues' to the Last Frontier*, DESTINATION: ARCTIC, DRILLING IN THE LAST FRONTIER, AN E&E SPECIAL REPORT, (Nov. 1, 2012), *available at* http://www.eenews.net/special_reports/destination_arctic/stories/1059971829 (last visited Dec. 17, 2014); *Shell, Native corporations team up for offshore operations*, ALASKA DISPATCH NEWS (Jan. 23, 2010), *available at* http://www.adn.com/artcile/20100113/shell-native-corporations-team-offshore-operations (last visited Dec. 17, 2014).

[3] Minerals Management Service (MMS), Final Lease Stipulations, Oil and Gas Lease Sale 193, Chukchi Sea, February 6, 2008 (Lease Stipulations) at 10.

The record supporting BOEM's decision to impose the stipulation does *not* support a broad interpretation that would extend to a lessee's contractors. In their respective National Environmental Policy Act (NEPA) and Endangered Species Act (ESA) documents analyzing the impacts of the lease sale, both BOEM and the U.S. Fish and Wildlife Service (USFWS) have acknowledged the desirability of having oil spill response assets in Ledyard Bay. One of the two Reasonable and Prudent Measures that USFWS imposed in its 2007 Biological Opinion on the original lease sale was the implementation of oil spill response measures in the LBCHU.[4] That requirement is addressed in part by Stipulation No. 7(A)(2)(b), which requires that surface vessels transiting in Ledyard Bay between April 15 and June 10 "have ready access to wildlife hazing equipment," either on board or "in Point Lay or Wainwright."[5] The discussion of this point in the NEPA analysis prepared in 2007 for the original lease sale goes further, specifying that such response equipment must be readily accessible "to oil-spill response personnel that are trained in its use."[6]

As the 2007 FEIS recognized, oil spill response equipment is useful only to the extent that those who will use it have been trained in its use. To best prepare for the conditions that may be encountered in Ledyard Bay, oil spill response personnel should be training in Ledyard Bay. Further, while Stipulation No. 7's requirement for staging oil spill response equipment is limited to the period between April 15 and June 10 – and only when surface vessels are transiting the LBCHU – environmental protection would be enhanced by staging such equipment and trained personnel in Ledyard Bay throughout the open water season to prepare to respond in the event of a spill event *outside* Ledyard Bay that could result in a trajectory that would transport spilled oil into Ledyard Bay.

III. BOEM Has Not Analyzed the Economic Impact of Lease Sale Stipulation No. 7 On Point Lay.

Although BOEM is now on its third NEPA review of this lease sale, the voluminous NEPA documents that have been prepared fail to analyze the impact of Stipulation No. 7 on Point Lay. BOEM and its predecessor agency, MMS, have generally taken the position that the lease sale would lead to only limited increases in local employment. Even though the BOEM has responded to the Ninth Circuit decision in the *Native Village of Point Hope v. Salazar* by significantly increasing its production scenario to include a 2.9 billion barrel (Bbbl) anchor field and a 1.4 Bbbl satellite field, the Draft Second SEIS does not discuss the possibility of a lessee contracting with a local corporation for portions of this expanded work in support services or oil spill response, or the positive effect such a contract could have on the community, both through

[4] USFWS, Biological Opinion for Chukchi Sea Planning Area Oil and Gas Lease Sale 193 and Associated Seismic Surveys and Exploratory Drilling (March 2007) ("2007 Biological Opinion") at 68-69.

[5] Lease Stipulations at 9.

[6] MMS, Chukchi Sea Planning Area Oil and Gas Lease 193 and Seismic Surveying Activities in the Chukchi Sea, Final Environmental Impact Statement (May 2007) ("2007 FEIS") at II-12.

local hire and through the benefits that would accrue to the local residents as shareholders in the Alaska Native Corporation.

Stipulation No. 7 has the potential to further minimize the limited lease sale benefits BOEM foresees for local residents because, if interpreted to apply to Alaska Native Corporations contracting to support a lessee, it would foreclose Cully from pursuing this opportunity on behalf of its shareholders. The Stipulation also has the potential to eliminate any mitigating positive Environmental Justice (EJ) impacts, as Alaskan Native subsistence-based communities fall under BOEM's EJ analysis. The record does not indicate that BOEM or MMS ever considered the possibility that Stipulation No. 7 could negatively impact local communities. In 2007, BOEM said simply with respect to the economic effects of the lease sale: "The standard stipulations and [Information to Lessees] clauses would not change the effects analyzed."[7]

IV. An Oil Spill Response and Support Services Program Based in Point Lay Would Be Beneficial to the Region.

Since the occurrence of Exxon Mobil oil spill and minimal recovery in Valdez waters, it has caused Cully to seek and place protective measures on our lands and community surroundings. An oil spill response and support services program at Point Lay would bring both environmental and economic benefits. USFWS's Reasonable and Prudent Measure does not impose a temporal limit on the time when an oil spill response program should be provided in Ledyard Bay. In Stipulation No. 7(A)(2)(b) BOEM responded to USFWS's concern by imposing spill response requirements specific to Ledyard Bay that are applicable *only* when vessels are actually transiting Ledyard Bay. This limited protection fails to address the risk that a spill outside of the bay could travel to and enter Ledyard Bay. If there are no oil spill response assets in the Ledyard Bay area, there is a chance that necessary equipment would not reach Ledyard Bay before the oil. Staging response equipment and personnel in Ledyard Bay eliminates the risk that response assets could not be transported to Ledyard Bay in sufficient time to mount a timely and effective response. Because the majority of our community depends on the Ledyard Bay ecosystem for our subsistence way of life, we are both highly motivated to protect the area and well-informed about the area and its resources. We believe Cully is uniquely suited to provide this service.

With no road systems out of Point Lay, our belief that Point Lay's location is uniquely advantageous for staging response assets is shared by the National Marine Fisheries Service (NMFS). NMFS is currently conducting a Marine Mammal Oil Spill and Disaster Planning analysis that goes beyond oil spill scenarios and includes other incidents that require response capacity, such as disease outbreaks, unusual mortality events, natural catastrophes, or unprecedented behaviors.[8] The results of this planning process have not been completed, but we are confident that the results will recognize the importance of a regional hub in and around Point

[7] 2007 FEIS at IV-185.

[8] Jen Dushane, "Marine Mammal Disaster Response Planning" (Presentation at Alaska Stranding Network Meeting, Alaska SeaLife Center, Seward, Alaska, April 2, 2014), Attachment A.

Lay that contains equipment, trained personnel, and unrestricted access to these shore-based facilities.

While we acknowledge that vessel transit in Ledyard Bay could theoretically affect listed eiders, we believe the program we propose could be structured to minimize impacts, if any, to eiders. We have prepared the attached Biological Assessment[9] to analyze the potential impacts that the program would have on listed species in the area. For the reasons discussed in that document, we believe that our proposed program will have little, if any effect on listed eiders in the area and will not adversely affect listed marine mammals that may be in the area. As members of the community that subsists in part on these resources, we believe the potential impact to these species is more than offset by the environmental benefit of having spill response assets and personnel on-site in the event of an oil spill.

An oil spill response and support services program would benefit the people of Point Lay in three ways. Most importantly, staging resources at Point Lay would alleviate any concern about response time in adverse weather conditions. If resources were staged only in Wainwright and Barrow, with the unknowns of weather conditions throughout the North Slope, we are concerned that spill response assets and personnel may not be able to reach our region in time. Our community would respond quickly to protect our local resources. Second, we believe we could operate the program with a higher percentage of local hire than BOEM estimates in the Draft Second SEIS. This would provide needed jobs to our community. Finally, even those of our community who are not employed in the project would benefit as shareholders in Cully.

* * *

Cully appreciates the opportunity to comment, and urges BOEM to address the application of Stipulation No. 7 in the Final Second SEIS to clarify that it does not apply to Alaska Native Corporations. We remain committed to working with BOEM on this topic and any others that may arise.

Yours very truly,

Marty Awalin
President/CEO
Cully Corporation

Enclosures: Attachments A and B

[9] Attachment B.

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

Marine Mammal Disaster Response Planning


Credit: Thomas Hallerman


Credit: NSB Wildlife Management


Credit: NOAA Office of Protected Resources

Jen Dushane
2014 Alaska Stranding Network Meeting
Alaska SeaLife Center, Seward Alaska
2 April 2014

Attachment A, Page 1 of 8

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

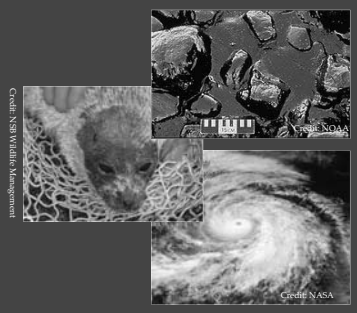
NATIONAL MARINE FISHERIES SERVICE

Northern Alaska Marine Mammal Disaster Response Plan

Objective

Develop a plan for Bering Strait, NW Arctic, and the North Slope of Alaska to respond to marine mammals in the event of:

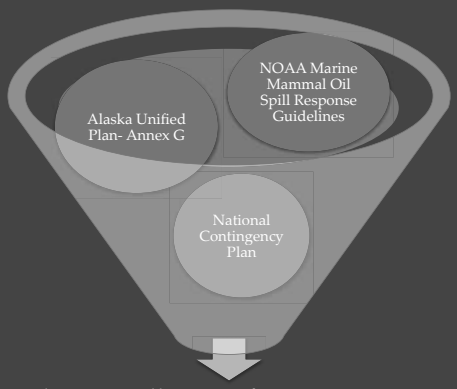
- **Oil Spills**
- **Disease Outbreak**
- **Natural Disaster**



Attachment A, Page 2 of 8

NATIONAL MARINE FISHERIES SERVICE

Spill Plans: What we have and what we need



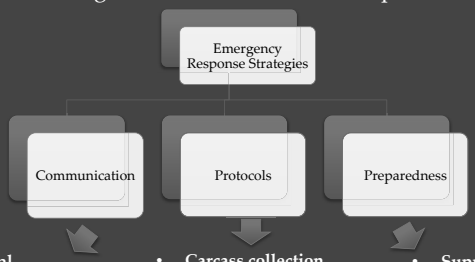
Need Regionally-Specific Marine Mammal Response Plans

Attachment A, Page 3 of 8

NATIONAL MARINE FISHERIES SERVICE

Arctic Marine Mammal Disaster Response Plan

How to get there- Work with Communities and Stranding Agreement holders to Develop:



- **Coastal communities**
- **Scientific and regulatory agencies**
- **Industry**

- **Carcass collection**
- **De-oiling treatment**
- **Rehabilitation**
- **Tissue Sampling**
- **Deterrence/Hazing**
- **Subsistence Food Considerations**

- **Supplies**
  - **Amount**
  - **Placement**
- **Infrastructure**
  - **Location**
  - **Function**
  - **Capacity**

NATIONAL MARINE FISHERIES SERVICE

Current Efforts

- **Work with Mike Ziccardi, author of the National Oiled MM Spill Response Plan to understand National strategy and tier off for Alaska**
- **Meet with co-management groups to discuss plan and gain input**

- **Work with communities to identify and develop the pieces of the plan that are Alaska and regionally-specific:**
  - **Food safety is a priority in any response plan**
  - **Subsistence activities must be a priority when considering response actions.**
  - **Local communities are involved in preparing for and responding to an event: communication, decision-making processes, response.**
  - **Remote locations, little to no infrastructure and equipment.**
  - **Plug into response structures that already work in communities**

Attachment A, Page 5 of 8

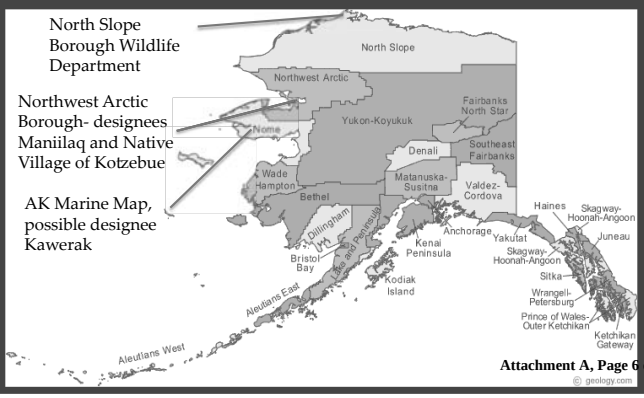
Alaska Plan Taking Shape

- Hub-centered response with local stranding agreement holder as lead
- NMFS prioritize getting samples to health officials for food safety information
- Local communities will likely be first responders- involve them in trainings and decision processes

North Slope Borough Wildlife Department

Northwest Arctic Borough- designees Maniilaq and Native Village of Kotzebue

AK Marine Map, possible designee Kawerak



Attachment A, Page 6 of 8

Continuing Efforts

- **Set expectations for response capabilities→ informs amount of equipment and trained personnel needed.**
  - **Stage main cache of equipment in hubs, and smaller caches in outlying communities**
- **Develop webinar/canned trainings for basic response, and make accessible to remote communities**
- **Add emergency article to stranding agreements for spill response**
- **Continue dialogue with regional hub stranding agreement holders, local communities, and other stakeholders**

Final Plan Due December 2014.

Attachment A, Page 7 of 8

Thank You!

Attachment A, Page 8 of 8

U.S. Fish & Wildlife Service

National Marine Fisheries Service

Biological Assessment – Section 7

December 2014

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1. INTRODUCTION

The Cully Corporation (Cully) was organized under the Alaska Native Land Claims Settlement Act and is the Alaska Native Corporation for the village of Point Lay, AK. The mission of Cully is to provide "a diversified field of professional services under its construction and service companies" that contributes to the overall well-being of its shareholders while simultaneously respecting the Iñupiaq heritage. Point Lay is located on the coastline of the Chukchi Sea where village hunters harvest bowhead and beluga whales, seals, walrus, caribou, and various fish. Point Lay is the closest village to the Outer Continental Shelf (OCS) 193 Lease Sale in the Chukchi Sea, especially the Devils Paw Prospect leased by ConocoPhillips Alaska, Inc. (CPAI).

Cully intends to provide support services for CPAI, including an oil spill response (OSR) program designed to protect resources which the Point Lay community harvests and depends on. However, an effective OSR program requires vessel travel between Point Lay (or alternatively Cully's Cape Sabine property), and a marine area for conducting training exercises, both of which would result in transiting the Ledyard Bay spectacled eider critical habitat unit (LBCHU). The Bureau of Ocean and Energy Management (BOEM) imposed a stipulation on leases issue in Chukchi Sea federal OCS that restricts the time periods in which "surface vessels associated with exploration and delineation drilling operations" must avoid travel in the LBCHU (except in case of "emergencies or human/navigation safety") (Minerals Management Service [MMS] 2008). It is not clear what legally preclusive effect this stipulation may have on operations by a contractor, such as Cully, working with a lessee. BOEM has left open the option of modifying this restriction through the Endangered Species Act (ESA) Section 7 process with the United States (U.S.) Fish and Wildlife Service (USFWS) (MMS 2007). As some of the activities associated with establishing a travel corridor between Point Lay and offshore lease areas would require channel dredging, construction of in-water structures, and perhaps wetland fill, Cully would need to secure Section 10 permitting from the U.S. Army Corps of Engineers (USACE), this federal permitting process would trigger the need for Section 7 consultation between the USACE and the USFWS. This biological assessment has been prepared in support of that process.

1.1. Project Elements

1.1.1. Oil Spill Response Support

Point Lay would be an ideal location for OSR supply storage given its location relative to the Devils Paw Prospect (Figure 1). The OSR facility would consist of a 2,500 square foot warehouse and three Connex storage units with containment equipment on a 1-acre gravel pad (Figure 2). Three OSR 34-foot work boats for near shore and LBCHU spill response would be stored in this warehouse adjacent to the gravel marine landing for the proposed jetty. Gravel would be brought in by truck from the gravel supply area northeast of Point Lay, near the mouth of the Kokolik River. A mini barge for oil spill recovery would also be stored adjacent to the work boat warehouse. The work boats would be loaded with containment equipment, ready for deployment.

Figure 1: Overview map.

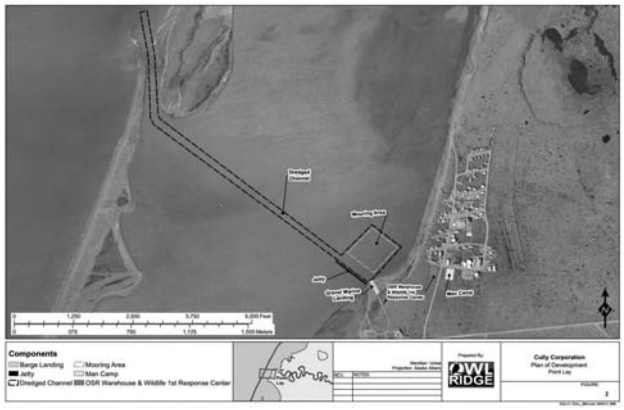

Figure 2: Plan of development Point Lay.

Booms and boom-arms for skimming, sorbents, propane torches, fire booms, weir skimmers, rope mops, pumps, generators, and bladders would be stored in the Connex units. Also on-hand would be a polar bear culvert trap, pre-booming equipment for fuel transfers, diaphragm pumps or power packs, and a fastank storage tank for recovered spills. Equipment would be designed for ease of operation, reliability, robustness, flexibility, and Arctic conditions. OSR staged equipment would undergo monthly inspection to ensure it is ready for deployment and secure in an emergency.

A Point Lay command center would be housed in the man camp facility described below, and outfitted with a radio subscriber unit, a marine radio, telephone, and satellite phone. Two full-time OSR personnel would be stationed in the command center to monitor communications. These personnel would work 12-hour shifts to keep the command center operating continuously. Other spill response personnel in Point Lay would be on-call and carry paging systems to monitor spill response needs. The spill response operating team would be on-call 7 days a week on a 24-hour basis.

A response and recovery center would be developed in Point Lay adjacent to the OSR warehouse, on the same 1-acre gravel pad. This 1,500-square-foot wildlife First Response Center would have facilities for handling, training, and necropsies. A -80° chest freezer would be installed in the facility. Any animals needing rehabilitation would be sent to the Seward Sea Life Center.

Cully would like to develop:

a) travel corridors through the LBCHU,
b) a training area within the LBCHU to educate OSR personnel,
c) a sufficiently dredged channel to allow for large vessels to access Point Lay, and
d) a mooring area and jetty for large vessels in support of OSR and drilling operations support.

Cully has recently taken title to the former Navy Defense Early Warning Station at Cape Sabine, which is an alternative location for the proposed activities. Dredging and construction of in-water vessel landing structures would require permits under the USACE Section 404 and Section 10. The corridors and training areas would be addressed in the Section 7 ESA consultation associated with the USACE federal permitting.

Since no deep water port exists at Point Lay, a channel through Kasegaluk Lagoon would be dredged from the existing break in the barrier islands, to a mooring area and jetty developed adjacent to the village of Point Lay (Figure 2). The existing Barrier Island channel across from Point Lay (Point Lay passage) was originally dredged by the Air Force. The length of the dredge channel Cully proposes is 7,935 feet (2,419 meters). The dredged channel would be 50 feet deep and 200 feet across to accommodate OSR and drilling operation vessels currently used in the Chukchi Sea. The mouth of the break in the barrier islands is approximately 172 feet at the narrowest point. The dredged channel would be maintained throughout the drilling season by a barge with excavation crane, and a tug boat.

The mooring area and jetty would be large enough to allow for easy loading and unloading of vessels. This Biological Assessments assumes that the mooring area would measure approximately 656 x 820 feet (200 x 500 meters) and that the jetty would be constructed of locally sourced gravel and extend 820 feet (250 meters) from the shore. The mooring area and jetty would allow for several ships to remain moored at any one time, including vessels such as a containment barge, an OSR vessel, 34-foot work boats, a near shore OSR tug/barge, an oil storage tanker, opportunity skimming systems, and a 47-foot Rozema skimmer.

A gravel marine landing, adjacent to the jetty, would link to the road system in Point Lay with access to the man camp. Kasegaluk Lagoon would provide an ideal vessel mooring area to protect vessels during storm events. Currents near shore on the Chukchi Sea generally vary between 1-3 knots. Pack ice breaks off around May, with young ice forms disappearing in late June. Freeze up occurs approximately the second week of November (ACS Tech Manual, 2010).

Outside Kasegaluk Lagoon, a travel corridor would be designated to Devils Paw Prospect, either from (1) the existing break in the barrier islands at the terminus of the dredged channel from Point Lay, or (2) from Cape Sabine. These corridors would traverse the LBCHU, but would be established to avoid the molting spectacled eider concentration areas (Figure 3) identified by the USFWS (Larned *et al.* 1995, Petersen *et al.* 1999). These corridors would be 1-mile wide, allowing for the largest spill response vessels to turn around within the corridors. These corridors would be used to support both OSR and drilling operation activities.

OSR vessels would travel through the proposed transit corridor to Point Lay at the beginning of the open water season, and remain moored at Point Lay unless responding to a spill or training in the proposed training area. OSR vessels would minimize high-intensity work lights while traversing the LBCHU. Exterior lights would only be used as necessary, and would otherwise be turned off. Safety lighting may remain on during navigation.

A training area measuring 25 square miles would be designated within the LBCHU (Figure 3). On-water drills would take place with a maximum frequency of once per day during the open water season, with a maximum 8-hour exercise period. The training area would be marked with anchored buoys to prevent personnel from leaving the training area except through the proposed travel corridor or existing travel corridor adjacent to the shoreline. Part of the training area would extend to near shore and part would be within the LBCHU, to allow for practice exercises concerning both locations.

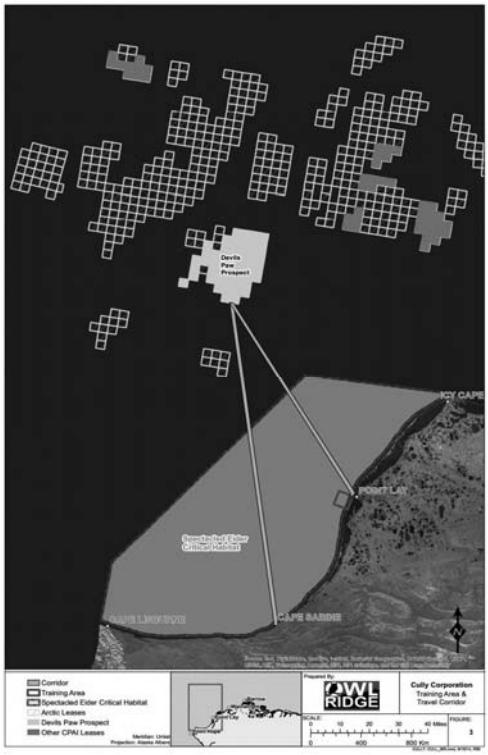

Figure 3: Training area and travel corridor.

In the event of a spill, spill response needs would be determined at the command center. If needed, the oil spill operating team would be paged using supplied paging systems. The command center would coordinate with Alaska Clean Seas (ACS) or the contracted spill response provider for the exploration program at which the spill occurred. A helicopter staged at Point Lay would be used by the command center to determine the best actions for spill response.

Crews would prepare necessary equipment for the planned spill response. Wildlife hazing equipment will be readied as a first priority. Wildlife rehabilitation specialists, oil spill responders, and other support personnel would remain onshore. BOEM's recent modeling indicates a spill in the vicinity of Devil's Paw Prospect is not expected to reach Kasegaluk Lagoon or LBCHU within three days; there is a 1 percent chance a spill from that area could reach LBCHU within 10 days, and no spill from that area is modeled to reach Kasegaluk Lagoon within 10 days (BOEM 2014). BOEM expects that the scenario with the highest likelihood of contact to Kasegaluk Lagoon or Ledyard Bay within 3 days would be a hypothetical pipeline spill that would have a 27 percent chance of reaching the LBCHU within 3 days.

Work boats would be used for a combination of towing containment booms, crew changes, and re-fueling. These boats would be used in near shore and LBCHU oil spill containment and recovery. Crews would work a 12-hour shift. Each work boat takes a crew of six per shift to operate the work boat, boom, and anchor systems.

Tactics for containing a spill in the LBCHU include containment with a U-boom, utilizing two work boats and boom equipment to encircle a visible spill. The mini-barge would be used to recover oil using the third work boat and a pump with suction hose. The mini-barge would shuttle between the spill and gravel marine landing at Point Lay, to transfer stored spill material to the fastank onshore. This set-up is ideal for handling smaller spills, in addition to supporting larger operations (ACS Tech Manual 2010). Tactics for containing a spill near Point Lay include deflection and exclusion booming in open water. Both tactics require two work boats, 500 feet of boom, and anchor systems. Deployment time is three hours.

An OSR vessel, supplied by an exploration company, would be used in the unlikely event of spill discharge into the water. The OSR vessel would be moored at Point Lay, ready for deployment. ACS is a primary response action contractor, which would likely be tasked with containment, control, and recovery in offshore, near shore, and shoreline areas. ACS provides response training, spill management team support, program oversight, Auxiliary Contract Response Teams, the North Slope Spill Response Team, and Village Response Teams. ACS would provide training for spill response crews out of Point Lay.

1.1.2. Drilling Operations Support

Offshore operations require land based support – both for the OSR labor and equipment, and for operators. The Beluga Camp, run by Cully, has facilities to house construction crews during exploration and development. For exploration support, a 50-person man camp with kitchen unit would be located on an additional 1-acre gravel pad that would be developed south of existing village infrastructure, and northeast of the proposed gravel marine landing and deep water port (Figure 2). This camp is capable of accommodating crews from exploration projects in the Lease Sale 193 area. The housing and kitchen unit would consist of a modular design.

The camp would be entirely self-contained to prevent impacts to Point Lay. There would be little need for goods and services from Point Lay. Diesel fuel would be one of the few commodities purchased locally.

Cully would manage the camp, providing revenues for the shareholders and business. Local hires, if available, would be used to provide housing services and kitchen personnel. Five to ten full-time staff would be employed at the man camp. These staff would occupy roles of housekeeping, cooking, waste disposal, maintenance of facilities, and loading/unloading of supply vessels.

Heat and electricity would be provided by diesel generators, and water would be self-contained and separate. Sewage would be minimized by using incinerator toilets. Household waste, received water, and graywater and blackwater disposal would be through the North Slope Borough (NSB). Holding tanks onsite would be large enough to contain bi-weekly volumes. Storage for waste would be located adjacent to the man camp on the same gravel pad. Burnable waste would be incinerated. Supply vessels would be tasked with removing waste offsite.

Point Lay would have expanded air support through a heliport. A heliport would be designated adjacent to the man camp facility. Crew changes from offshore operations would take place using a Sikorsky S-92, Euro copter EC225, or similar long-range helicopter. Hanger space for a helicopter would be utilized in Point Lay within an existing 17,000 square foot hanger. Jet fuel would be stored adjacent to the heliport or supplied by the fuel services company at Point Lay Airport.

Approximately 40 round trip helicopter flights between shorebases and the prospect would occur each week for crew changes. The large number of flights would minimize weather delays and operational constraints. Helicopters would operate above 1,500 feet above sea level within LBCHU between July 1 and November 15, to the maximum extent practicable. Pre-designated flight routes would be established in case this altitude cannot be maintained. These flight routes would follow the proposed vessel transit corridor to minimize impacts.

Flights for drilling operation crew rotation would be out of Point Lay Airport by fixed wing plane. Existing airplane services in Point Lay would be utilized and expanded with increasing demand for flights to other destinations. Local commuter, RAVN Alaska currently runs flights from Barrow to Point Lay.

The Point Lay man camp would be supplied by airplane or vessel. Airplanes would deliver the bulk of the supplies, with a barge transporting less time intensive materials. Cargo airplanes capable of landing on the existing runway at Point Lay would be used.

The self-contained modular man camp would arrive by barge once the channel through Kasegaluk Lagoon has been dredged. The gravel marine landing would be approximately 150 feet wide, extending to a location that would facilitate both vessel unloading and the landing of a barge. A truck supplied by the rental company would move the modular camp into position on the gravel pad.

Supply barges would run twice per month through the dredged channel to the proposed gravel marine landing at Point Lay. Crew rotation would utilize vessels when inclement weather restricts helicopter flights. Crew rotation vessels would travel through the proposed transit corridor through LBCHU on an as needed basis.

2. ACTION AREA

The village of Point Lay is located inside Kasegaluk Lagoon on the Alaskan coast of the Chukchi Sea at latitude 69.742°N and longitude -163.010°W. Cape Sabine, a former Navy Defense Early Warning Station is located on the coast 54 miles south of Point Lay at 69.024°N, -163.853°W. The CPAI's Devils Paw Prospect is located 80 miles north-northwest of Point Lay, with the prospect center at 70.85°1N, -165.319°W.

There are four marine actions to be assessed:

1. Four 1-mile-wide travel corridors including an 80-mile corridor linking Point Lay with the Devils Paw Prospect, a 117-mile direct corridor between Cape Sabine and Devils Paw, a 92-mile corridor between Devils Paw and an alternative landing site approximately 10 miles south of Point Lay (Alternative 1), and a 122-mile corridor between Cape Sabine and Devils Paw that links with the Alternative 1 route in order to avoid areas known to support concentrations of molting spectacled eiders. All these corridors intersect the LBCHU (Figure 4).
2. A 25-square-mile OSR training area located immediately offshore of Point Lay (Figure 3), most of which would occur inside the LBCHU.
3. Dredging of the channel connecting the village of Point Lay and the open sea (Figure 2) to allow access by deeper draft vessels. (The existing Barrier Island channel across from Point Lay was originally dredged by the Air Force.)
4. Construction of various mooring and landing facilities at Point Lay, including a gravel marine landing and a pier or jetty structure (Figure 2).

The corridors would allow Devils Paw operations direct access to shore-based camps at Point Lay (or alternatively Cape Sabine), while dredging would ensure that the Point Lay passage (the break in the barrier island) remains open and accessible to vessels large enough to transport personnel and provide OSR support.

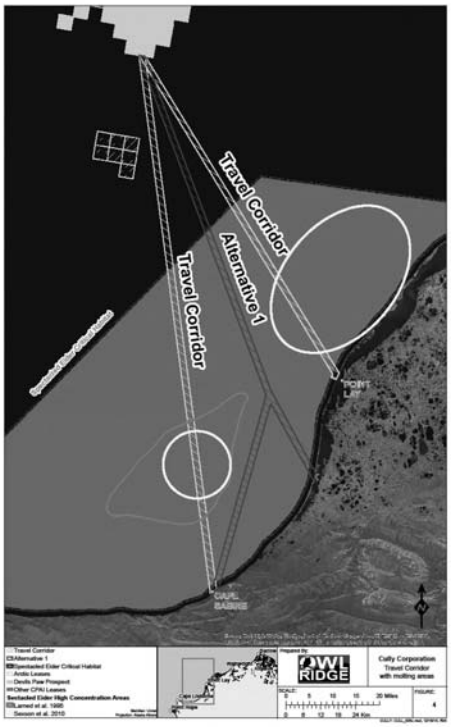

Figure 4: Travel corridor with molting areas.

3. SPECIES POTENTIALLY AFFECTED

Four species of marine mammals and three species of birds, currently listed, or candidates for listing, under the ESA, occur seasonally or year-round along Chukchi Sea coast where OSR training and travel activities would occur (Table 1). The bowhead whale, bearded seal, and ringed seal fall under the jurisdiction of the National Marine Fisheries Service (NMFS), while the Pacific walrus, spectacled eider, and Steller's eider are managed by the USFWS. Bowhead whales, bearded seals, and ringed seals generally migrate past Point Lay in association with sea ice, and are largely absent during the summer months when boat traffic between Point Lay and the Devils Paw Prospect would occur. Also, the few Steller's eiders that nest north of Point Lay are not expected to linger in the Action Area during migration. Of most concern are the project's effects on molting spectacled eiders in Ledyard Bay and walrus herds that occasionally haulout on the barrier islands of Kasegaluk Lagoon, including near Point Lay. All are addressed below.

Table 1: Listed marine mammals and birds potentially occurring offshore of Point Lay and Cape Sabine.

Species	Latin Name	ESA Status	Responsible Service
Bowhead Whale	*Balaena mysticetus*	Endangered	NMFS
Bearded Seal	*Erignathus barbatus*	Candidate	NMFS
Ringed Seal	*Phoca hispida*	Threatened	NMFS
Pacific Walrus	*Odobenus rosmarus*	Candidate	USFWS
Spectacled Eider	*Somateria fischeri*	Threatened	USFWS
Steller's Eider	*Polysticta stelleri*	Threatened	USFWS

4. STATUS OF LISTED SPECIES

Four ESA-listed species and two candidate species have been identified that could potentially occur in the marine waters offshore of Cape Sabine and Point Lay (Table 1). Each species' ESA status, biological status, and use of the action area are addressed below.

4.1. Bowhead Whale (*Balaena mysticetus*)

4.1.1. ESA Status

The Western Arctic stock of bowhead whale is one of five stocks recognized by the International Whaling Commission, and is currently the largest with an estimated population of 12,631 animals (Allen and Angliss 2014). This stock is currently listed as endangered under the ESA and "depleted" under the Marine Mammal Protection Act, although it has experienced significant growth in the past 30 years despite subsistence harvest.

4.1.2. Biological Status

4.1.2.1. Abundance and Trends

Pre-whaling population estimates for bowhead whales range between 10,400 and 23,000 animals. This population was reduced to approximately 3,000 whales by commercial whaling (Woodby and Botkin 1993). Since 1978, the bowhead whale populations have been growing at an annual rate of approximately 3.2 to 3.4 percent (George *et al.* 2004). The NMFS's most recent estimate is 12,631 animals (Allen and Angliss 2014).

4.1.2.2. Distribution and Habitat Use

This stock summers in the Canadian Beaufort Sea, migrates through the Alaskan Beaufort Sea, Chukchi Sea, and Bering Strait in the fall, and winters in the Bering Sea (Braham *et al.* 1984, Moore and Reeves 1993). Recent studies on bowhead migration indicate that migratory habits and corridors are loosely defined and subject to interannual variability (Clarke et al. 2014). The whales passing southward through the Chukchi often follow a route along the Siberian coast (Quakenbush *et al.* 2010). The whales follow open leads in the sea ice during their spring migration (March to mid-June) back to Canada (Braham *et al.* 1984, Moore and Reeves 1993). However, individual bowhead whales can be found throughout their range at almost any time of the year (Rugh *et al.* 2003, Moore *et al.* 2010).

4.1.2.3. Feeding and Prey Selection

Based on stomach, colon, and intestine samples collected from harvested bowhead whales in Alaska, this planktivorous whale feeds primarily on copepods, euphausiids, mysids, hyperiid amphipods, and gammarid amphipods.

From mid-June through October, most bowhead whales are found in the Canadian Beaufort Sea where they spend about 4 months feeding on mostly copepods (Fraker and Bockstoce 1980, Wursig 1985, Griffiths and Buchanan 1982). During their fall migration to Bering Sea wintering grounds, these whales feed only sporadically at specific locations. Lowry and Frost (1984) identified concentrations of whales presumed to be feeding in the vicinity of Kaktovik Island and Point Barrow, and some feeding is presumed to occur in the southern Chukchi Sea (Sleptsov 1961). Moore *et al.* (2010) found large feeding concentrations at two locations near Point Barrow, presumably feeding on copepods, mysids, and euphausiids based on stomach contents of whales harvested from Point Barrow during the years study. Final, using satellite tags, Quackenbush *et al.* (2013) confirmed Alaskan feeding concentrations at Point Barrow as well Bering Strait (fall migration). There is no evidence of feeding on the wintering grounds or during the spring migration.

4.1.2.4. Reproduction

Mating periods are largely unknown for this species, and may occur over a 6 to 7 month period. Data on fetus length collected from both spring and fall hunts confirm that while the breeding season might be extended, successful breeding (implantation) occurs over a relatively short period (late winter—early spring). There is no evidence of delayed implantation (Lockyer 1984).

Data on pregnancy rates (Nerini *et al.* 1984, Tarpley *et al.* 1988) suggest that mature females calve every 3 to 4 years, with a likely gestation period of 13 to 14 months. Most calves are born in April, May, and

early June, although bowhead neonates have been observed from March to October (Koski *et al.* 1993). The gross annual reproduction rate for the Alaskan bowhead population has been estimated at a low 0.052 calves/non-calf/year from 1982-1989, while the annual population growth has been about 3.5 percent per year since 1978 (George *et al.* 2004). This implies both a low mortality rate and an increase in the reproduction rate since 1989.

4.1.2.5. Natural Mortality

Natural mortality in bowhead whales has rarely been observed, although estimates of 3 to 7 percent annual mortality have been modeled (Breiwick *et al.* 1984). There is evidence of killer whale attacks on bowheads, occasional entrapment in ice leading to mortality, and that these whales can harbor a number of diseases and parasites (Philo *et al.* 1993). However, there is no information on the population level effects of any of these factors, and for nearly all strandings examined no cause of death has been determined (see Philo *et al.* 1993).

4.1.3. Species Use of the Action Area

Known migration patterns of bowhead whales in the Chukchi Sea suggest that fall migrating whales pass through the sea well west of the Action Area, while the spring migration would largely pass through the Action Area, but in late spring when ice is still present and travel corridors between Point Lay (or Cape Sabine) and Devils Paw would not be open. Based on the Aerial Surveys of Arctic Marine Mammals (ASAMM) program conducted in the Chukchi Sea since 2008 (Clarke *et al.* 2014), and the satellite tracking study (more than 60 tagged whales) conducted during 2006-2010 (Quakenbush *et al.* 2013), virtually no sightings of bowhead whales occurred in the vicinity of the proposed transit routes during the open-water period. The waters off Point Lay are not a known feeding area for this whale (Quakenbush *et al.* 2013), so the occasional animal occurring there during the open water period would probably be transiting to a more preferred habitat.

4.2. Ringed Seal (*Phoca hispida*)

4.2.1. ESA Status

Ringed seals were recently (2012) listed under the ESA due to diminishing snow and ice from climate change. They survive the winter by digging multiple haul-out shelters and nursery lairs beneath the snow (Kelly 1988). A loss of snow cover and ice coverage in general, poses a risk to long-term survival (Kelly *et al.* 2010a). NMFS has recently proposed critical habitat for ringed seals that, if adopted, would include the Action Area. 79 FR 73010 (Dec. 9, 2014).

4.2.2. Biological Status

4.2.2.1. Abundance and Trends

Ringed seals are the most common marine mammal in the Beaufort, Chukchi, and Bering seas. This Alaskan stock, a subpopulation of the Arctic subspecies (*P. h. hispida*), was most recently estimated at no less than 249,000 animals (Allen and Angliss 2014), although historic estimates have ranged as high as 3.6 million (Frost *et al.* 1988). Taking into account animals that summer in the eastern Beaufort and

Amundsen Gulf, Kelly *et al.* (2010a) considered one million animals a reasonable estimate for the entire Chukchi Sea and Beaufort Sea population.

4.2.2.2. Distribution and Habitat Use

During the open-water season, ringed seals are widely dispersed as single animals or in small groups and they are known to move into coastal areas (Smith 1987, Harwood and Stirling 1992, Moulton and Lawson 2002, Green *et al.* 2007). Tagging studies have shown that Alaskan seals follow two different strategies. Some seals tagged at coastal breeding areas remain the summer in the vicinity, while other seals tagged at these sites travel hundreds of kilometers to keep within the pack ice (Kelly *et al*. 2010b). During the winter, seal movement is limited by the number of breathing holes maintained with home ranges of about 1 square kilometer or less (Kelly *et al.* 2010b). Once snow levels are sufficient, ringed seal build subnivean lairs above breathing holes for protection against extreme temperatures and predators, and for pupping, further restricting their home range.

4.2.2.3. Feeding and Prey Selection

Ringed seals feed on a wide variety of prey, but usually on smaller prey that form dense aggregations, especially gadid fish (Labansen *et al.* 2007). Ice-associated Arctic cod are especially important during the winter months, but during the open-water period ringed seals shift to a more varied diet Saffron cod, sculpins, shrimp, euphausiids, and amphipods (Johnson *et al.* 1966, Cameron *et al.* 2010).

4.2.2.4. Reproduction

Female ringed seals become sexually mature between ages 4 and 8, while males between 5 and 7 years (Kelly *et al.* 2010a). Whelping occurs late March to April when snow cover is at its maximum and suitable subnivean birthing lairs can be constructed (Kelly 1988). Generally only one pup is born, but rarely two are born (Kelly 1988). The reproductive rate in Alaska has been measured at 0.86 (Johnson *et al.* 1966). Pups are nursed for about 39 days (Hammill *et al.* 1991) and then begin molting their natal pelage soon after weaning (Kelly 1988). Mortality rates for Alaskan pups have been measured at between 30 and 41 percent dropping to 10 percent at sexual maturity (Kelly 1988).

4.2.2.5. Natural Mortality

Although a number of predators have been observed preying on ringed seals, the primary predator is the polar bear. Ringed seals make up as much as 98 percent of the diet of polar bears inhabiting the Beaufort Sea (Cameron *et al.* 2010). In some areas, Arctic foxes can be a significant mortality factor by digging into ringed seal lairs and killing newborn pups.

A wide variety of parasites have been found in ringed seals, but their population level effects are unknown. Given their prevalence in other phocids such as harbor seals, diseases (*e.g.*, distemper) may have the ability to affect ringed seals as well. However, disease has not yet been identified as a major mortality factor in this species, possibly because disease transmission is limited in the Arctic, or among less gregarious animals like ringed seals.

4.2.3. Species Use of the Action Area

Ringed seal tagging studies conducted by Kelly *et al.* (2010b) determined that seals tagged on the Chukchi Sea coast (Peard Bay) maintained a small home range while ice was present, but traveled for hundreds of kilometers during the open water period, largely to stay in contact with the pack ice. A similar pattern is expected off Point Lay and in Ledyard Bay with significant numbers of seals wintering in the area, but low numbers occurring during the open water period.

4.3. Bearded Seal (*Erignathus barbatus*)

4.3.1. ESA Status

In 2012 NMFS listed the Beringia Distinct Population Segment (DPS) of bearded seals as threatened as a result of the species' seasonal dependence ice which makes them vulnerable to declining ice conditions due to climate change. The U.S. District Court for the District of Alaska recently vacated that decision. *Alaska Oil & Gas Association v. Pritzker*, No. 13-18-RRB (D. Alaska July 25, 2014). This Biological Assessment treats the species a candidate species.

4.3.2. Biological Status

4.3.2.1. Abundance and Trends

There is no reliable population estimate for bearded seals. Cameron *et al.* (2010) provided a conservative estimate for the Beringia Distinct Population Segment (the population that winters in the Bering and Chukchi seas) of 155,000, based on data collected over the last four decades.

4.3.2.2. Distribution and Habitat Use

The Alaska stock of bearded seals is seasonally found in the shelf waters of the Beaufort, Chukchi, and Bering seas. They are closely associated with ice, preferring to winter in the Bering Sea and summer along the pack ice edge in Chukchi Sea, although many summer in nearshore waters of the Beaufort Sea. Preferring areas of 70 to 90 percent ice coverage, but unlike ringed seals, few bearded seals overwinter in the Chukchi and Beaufort seas (Allen and Angliss 2014). Pupping occurs on ice floes primary in May in the Bering and Chukchi seas.

4.3.2.3. Feeding and Prey Selection

Bearded seals feed primarily on benthic organisms found on the ocean floor (Cameron *et al.* 2010). Their name is derived from their prominent vibrissae or whiskers, highly sensitive tools for detecting benthic prey in low-light conditions. Although bearded seals feed on a very wide variety of prey, the bulk of their diet is bivalve mollusks, crabs, shrimp, and ice-associated fish such as Arctic cod (*Boreogadus saida*). In the Bering and Chukchi seas, clams appear to be most important during the ice-free summer, while crustaceans (shrimp and crabs) are important during the winter. Clam beds may be less accessible during the winter due to ice cover (Johnson *et al.* 1966).

4.3.2.4. Reproduction

Female bearded seals reach sexual maturity at ages 5 to 6, while males at ages 6 to 7. Females generally birth annually as Quakenbush *et al.* (2010) found pregnancy rates between 88 and 94 percent in Alaskan

seals. As with most seals, only a single pup is born. Bearded seals bear and nurse their young on open ice-floes during the spring when the sea ice first begins to break up (Cameron *et al.* 2010). Available information suggests that most whelping occurs near the polynyas associated with St. Lawrence and St. Matthew islands in April and May, then soon after nursing, mothers follow the receding ice north into the Chukchi Sea. Some bearded seals whelp in the Chukchi Sea in spring shore leads near Point Hope (see Cameron *et al*. 2010). Initial pup mortality rates are high (60 percent) but decrease considerably after year one (19 percent) (Burns and Frost 1979, Nelson *et al.* 1984).

4.3.2.5. Natural Mortality

Other than predation by polar bears, little is known about the natural mortality of adult bearded seals (Fay *et al.* 1978). Polar bears are the primary predator besides man (Cleator 1996), although they are occasionally taken by killer whales and Pacific walrus. In some regions, bearded seals make up 50 percent of the biomass consumed by polar bears. Bearded seal pups take to the water soon after birth, which is thought to be an adaption to avoid polar bears.

Because bearded seals are not gregarious, they may be less susceptible to disease transmission, but overall little is known about diseases in this species (Burns 1981, Kelly 1988). Bearded seals have been found to be infected by a number of parasites, some of them potentially lethal (Cameron *et al.* 2010), although parasite contribution of annually mortality is unknown. There is concern that warming ocean conditions may contribute to the increased prevalence of parasites (Jensen *et al.* 2010).

4.3.3. Species Use of the Action Area

For the most part, adult bearded seals winter in the Bering Sea and summer in the northern Chukchi Sea and the Beaufort Sea. Their occurrence in the Action Area is largely limited to late spring and early fall as the sea ice frontal margin passes through the area, and again in the fall when the frontal margin again advances. However, a small number of mostly juvenile bearded seals will remain along the Chukchi Sea coast through the open water summer (Burns 1981), and small numbers have been found throughout the Chukchi Sea during open-water ASAMM aerial surveys conducted since 2008 (Clarke *et al.* 2014).

4.4. Pacific Walrus (*Odobenus rosmarus divergens*)

4.4.1. ESA Status

The Pacific walrus was petitioned for listing in 2008. After a 12-month review ending in 2011, the USFWS concluded that listing was warranted, but precluded by higher priority listing actions. In the interim, the Pacific walrus has been placed on the candidate species list. The primary reason listing is warranted is the expected effects of declining sea ice on walrus ecology. There is no designated critical habitat for an unlisted species. However, some areas of importance to walrus are known. Walrus have recently begun hauling out during summer on the U.S. Chukchi Sea coast near Point Lay, Point Hope, and Cape Lisburne. Other important walrus haulout sites occur in the Bering Sea and are protected under state and federal refuge systems, including the Walrus Protection Areas that have been established for the federal waters within 12 nautical miles of Cape Peirce, The Twins, and Round Island, and proposed for Hagemeister Island (MacLean 2012). Separately, USFWS has identified the Hanna Shoal Walrus Use

Area as a high use foraging area used by walrus in the summer and fall in recently promulgated Incidental Take Regulations. 50 CFR 18.118(a)(4)(v).

4.4.2. Biological Status

4.4.2.1. Abundance and Trends

Fay (1982) estimated that prior to 19th Century, commercial harvest the Pacific walrus was at a minimum 200,000 animals. To what extent the 19th Century harvest reduced the population is unknown, but a second wave of commercial harvest in 20th Century was thought to have further reduced the population to between 50,000 and 100,000 animals by the mid-1950s (Fay *et al.* 1997). Once released from harvest, the population increased rapidly and was again at or above carrying capacity by the late 1970s or early 1980s (Fay *et al.* 1989, 1997). Joint Russian-American surveys began in 1975 and were conducted every 5 years until 1990. These surveys produced Pacific walrus population estimates of approximately 200,000 to 300,000, but were based on fall counts at terrestrial haulout sites and a small sample of ice-edge habitat. Also, these estimates were not able to accurately account for animals that were swimming at sea. Due to difficulties in accounting for bias, accurate variances for these population estimates could not be generated, and were presumed to be high (Gilbert *et al.* 1992, Gilbert 1999, Udevitz *et al.* 2001). The estimates could not be used in detecting trends (Gilbert *et al.* 1992, Hills and Gilbert 1994). In 2000, U.S. and Russian scientists revisited the problems associated with the survey methodologies and began collective research using new technology to identify and reduce bias (Garlich-Miller and Jay 2000). Over the next few years, new study designs and methods were developed and a bilateral survey was again conducted in spring 2006 (Speckman *et al.* 2011). This survey resulted in an estimate of 129,000, albeit with high confidence limits of between 55,000 and 507,000. Also, beset by weather problems, only a portion of the study area was successfully surveyed, leaving the estimate to represent only about half the potential walrus spring habitat (Speckman *et al.* 2011). This, and unknown bias effects to previous surveys, limits the ability to determine if the current Pacific walrus population is increasing, declining, or stable.

4.4.2.2. Distribution and Habitat Use

Seasonal distribution of walrus varies in response to sea ice conditions. During the winter, walrus can range as far south as the Alaska Peninsula, especially during years of extensive sea ice. During summer, they will travel with the ice to the northern reaches of the Chukchi Sea, where the continental shelf gives way to the Arctic Ocean basin. However, the primary distribution is the shelf waters of the Chukchi Sea during the summer and northern Bering Sea during the winter following the advance and retreat of sea ice. During summers when ice-edge retreats north in the deep Arctic Ocean basin waters, large numbers of walrus will haulout on Wrangell Island or the Chukotka coast (Fay 1982). Recently, large groups of walrus have begun hauling out on the U.S. Chukchi Sea coast near Point Lay, Point Hope, and Cape Lisburne. For example, on September 27, 2014, USFWS biologists observed approximately 35,000 walrus hauled out on a barrier island very near Point Lay, which they attributed to the loss of floating ice within the Chukchi Sea at that time of year.

4.4.2.3. Feeding and Prey Selection

Pacific walrus feed primarily on benthic bivalves, using their muzzles and whiskers to detect prey, and their noses, flippers, and jetted water to extract them from the sediment (Fay 1982). They use mouth suction to remove soft tissue from the shells (Fay 1982). Feeding is not limited to bivalves. Other benthic invertebrates are also consumed, as are occasionally fish and vertebrates, including seals (Fay 1982, Sheffield *et al.* 2001, Sheffield and Grebmeier 2009). Local diet is generally reflective of what is available (Sheffield and Grebmeier 2009), and walrus play a major role in the benthic ecosystem (Garlich-Miller *et al.* 2011).

4.4.2.4. Reproduction

Fay (1982) stated that walrus have the lowest production rate of any pinniped. While females attain sexual maturity at 4 to 7 years of age, males are unlikely to successfully compete or breed until they are about 15 years old (Fay 1982, Garlich-Miller *et al.* 2006). Generally, a single calf is produced and is typically nursed for up to 2 years. Thus, calving intervals can be 3 years or more (Garlich-Miller and Stewart 1999). Low birth rates are offset by high parental care leading to relatively high first year survival rates (Fay *et al.* 1997). Adult survival is especially high at more than 96 percent for age classes 4 to 20 (DeMaster 1984, Fay *et al.* 1997), declining to zero by about age 40 (Chivers 1999). The maximum population growth rate has been estimated at 8 percent (Chivers 1999).

4.4.2.5. Natural Mortality

Walrus calves and pregnant females are more susceptible to death than males from trampling and polar bear predation. Fay and Kelly (1980) identified the principal cause of death of several hundred carcasses at coastal haulouts in the Bering Sea to trauma from trampling, during either stampedes or battles between bulls. Calves are especially susceptible to mortality during beach stampeding events (Fischbach *et al.* 2009, Kochnev 2010, Udevitz *et al.* 2013). In 2009, Fischbach *et al.* (2009) recorded 131 dead juvenile walrus on the Alaska beaches near Icy Cape, the deaths were attributed to stampede events. Udevitz *et al.* (2013) determined that if walrus continue to annually use terrestrial haulout sites, calf mortality from stampede events could have a greater population effect than subsistence harvest, the current primary source of mortality.

Early research on walrus found little actual evidence of polar bear predation on walrus other than the potential for predation on calves (Fay 1982). Later research by Calvert and Stirling (1990) found polar bears to be important predators of walruses in the central Canadian High Arctic in late winter and early spring, and predation has been witnessed both on land and ice in the Bering and Chukchi seas (Stirling 2011). Killer whales also prey on walrus (Jefferson *et al.* 1991), especially in the Anadyr Gulf of Russia (Kryukova *et al.* 2012).

4.4.3. Species Use of the Action Area

During the January to March breeding season, walrus breeding aggregations (tens of thousands) form in the ice lee south of Nunivak Island and just west of Kuskokwim Bay (Garlich-Miller *et al.* 2011). However, as the sea ice begins to deteriorate, these walrus migrate north and by May most of the population is concentrated near the Bering Straits (Fay 1982). These wintering and breeding herds do not temporally overlap with the proposed travel corridors between Point Lay and the Devils Paw Prospect.

During the summer season a few thousand walrus, mostly males, remain in the Bering Sea (Garlich-Miller *et al.* 2011), most of the Pacific walrus move north into the Chukchi Sea to feed from floating ice platforms. Many of these walrus would pass through the Action Area as they follow the retreating sea ice northward. During the warm years, in late summer and early fall, where floating ice disappears from the Chukchi Sea thousands of walrus will haulout on land at traditional locations like Wrangell Island or the Chukotka coast (Fay 1982). Since 2007, large herds of walrus have been reported hauling out along the U.S. Chukchi Sea coast during years where late summer ice dissipates beyond the continental shelf edge (Fischbach *et al.* 2009). Most recently, it was reported 10,000 to 35,000 walrus have been hauling out on the U.S. Chukchi Sea coasts near Point Lay, Point Hope, and Cape Lisburne. It is during these events that large numbers of walrus might be found in the vicinity of the Action Area for extended periods. Clarke *et al.* (2014) noted that during ASAMM aerial surveys conducted in 2013, in July and August walrus were found associated with ice well north of the Action Area (*e.g.*, near Hannah Shoals), and in September the walrus were observed near Point Lay associated with the terrestrial haul out event.

4.5. Spectacled Eider (*Somateria fischeri*)

4.5.1. ESA Status

The spectacled eider was listed as threatened under the ESA in 1993 after the Yukon-Kuskokwim Delta breeding population declined from about 48,000 in the 1970s to only about 2,000 in the early 1990s (Stehn *et al.* 1993, Ely *et al.* 1994). Reasons for the decline are unknown, but appear to be related to adult mortality outside the breeding season (Flint *et al.* 2000), and may relate to ingestion of toxic lead shot (Grand *et al.* 1998). Critical habitat, targeting protection of Yukon-Kuskokwim Delta breeding habitat and molting habitat in Ledyard Bay and Norton Sound, was designated in 2001. A recovery plan was finalized in 1996.

4.5.2. Biological Status

4.5.2.1. Abundance and Trends

The range-wide spectacled eider population appears to have remained stable or increased slightly in recent years. Petersen *et al.* (1999) estimated the 1997 population at 363,000, while Larned *et al.* (2012) estimated the 2010 wintering population at 369,122. However, significant declines have occurred in Alaska at least. The Yukon-Kuskokwim Delta breeding population used to be larger than the Russian and northern Alaska population combined with an estimated 48,000 to 70,000 pairs annually breeding there prior to 1972 (Dau and Kistchinski 1977). By 1992, however, only an estimated 2,000 pairs remained (Stehn *et al.* 1993). Since then, the Yukon-Kuskokwim Delta breeding population has grown at an annual rate of about 7 percent, and the number of breeding birds exceeded 12,000 by 2010 (Platte and Stehn 2011).

Breeding population estimates are unavailable for the North Slope before 1992 other than Warnock and Troy (1992) documented an 80 percent decline in nesting in the Prudhoe Bay area between 1981 and 1991. Stehn *et al.* (2006) used data collected from 2002 to 2006 to estimate the 2006 North Slope breeding population of 13,000 birds. From data collected by Larned *et al.* (2011) between 2007 and 2010, the estimate was less at about 11,000.

4.5.2.2. Distribution and Habitat Use

Spectacled eiders breed in coastal habitats at three locations in arctic Russia, and on the North Slope and the Yukon-Kuskokwim Delta in Alaska, usually arriving in May (Johnson and Herter 1989). During late May and June, Alaskan males leave the breeding grounds and concentrate at molting areas in Ledyard Bay and Norton Sound (Petersen *et al.* 1995). Successful females and juveniles arrive at these molting areas in September. The range-wide population winters in the polynyas that form south of St. Lawrence Island (Petersen *et al.* 1999) in an area of only about 3,885 square kilometers (1,500 square miles).

4.5.2.3. Feeding and Prey Selection

Spectacled eider diet during the breeding season is composed largely of freshwater flies, shrimp, snails, and pondweeds (Petersen *et al.* 2000). In marine molting and wintering areas, these eiders eat primarily snails, clams, mussels, amphipods, and juvenile crabs (Petersen *et al.* 2003), although Macoma clams were the dominant food occurring in 72 percent of the samples (Petersen *et al.* 1998). Spectacled eiders were found to forage for this prey at depths between 150 and 230 feet (45 and 70 meters) (Petersen *et al.* 1998). Goudie and Ankney (1986) suggested that small ducks wintering in northern latitudes, such as spectacled eiders, do so at the edge of their energetic limits.

4.5.2.4. Reproduction

Spectacled eiders prefer to nest on islands and peninsulas or along pond shorelines (Petersen *et al.* 2000) where escape to protective water is nearby. Clutch size can vary from 1 to 11, with the average size of 5 eggs on the Yukon-Kuskokwim Delta and 3.5 eggs for the North Slope (Petersen *et al.* 2000). The incubation period is 24 days, and chicks fledge at 45 to 50 days (Petersen *et al.* 2000). Hens will occasionally re-nest if first nest is lost.

About half the females nest in their second year, and generally nest for 5 consecutive years. Nesting success varies greatly depending on predator densities and weather conditions and ranged on the Yukon-Kuskokwim Delta from 12 to 78 percent (Grand and Flint 1997). Flint and Grand (1997) studied spectacled eider reproduction on the Yukon-Kuskokwim Delta and found that over the first 30 days of life, duckling survival was only 34 percent, but increased to 71 percent for the next 30 days . Grand *et al.* (1998) found that the adult females not exposed to lead shot contamination had a higher annual survival rate (78 percent) than those that were exposed (44 percent).

4.5.2.5. Natural Mortality

The primary nest predators are gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), foxes (red [*Vulpes vulpes*] and arctic [*V. lagopus*]), and mink (*Mustela vision*), depending on nesting area. Foxes and mink will also prey on nesting adults. These predators may have recently increased on the North Slope in response to increased human development (Day 1998). There is no information on natural mortality at sea. Storm tides can destroy nests and drown hatchlings (Petersen *et al.* 2000).

4.5.3. Species Use of the Action Area

Because Ledyard Bay affords shallow water with high prey resources, open leads in the late spring and early fall, low disturbance, and low predator abundance, if offers a suitable place for spectacled eiders to undergo annual feather molt (BOEM 2011), a condition leaving the birds largely flightless for a few

weeks. Soon after incubation begins, male spectacled eiders begin leaving the nesting areas on the Arctic Coastal Plain, and begin arriving in Ledyard Bay in July to begin molt (BOEM 2011). Females whose nests have failed begin arriving in the bay in August, while success-nesting females with young-of-the year arrive in September (BOEM 2011). After molt, spectacled eiders travel to their wintering area south of St. Lawrence Island, although many eiders do not depart Ledyard Bay until they are forced to in late October or mid-November (BOEM 2011). Thus, a portion of the Alaska nesting population is expected to occur within Ledyard Bay throughout most of the open-water season. Sexson *et al.* (2010) found spectacled eiders to concentrate in waters immediately northeast of Point Lay, and about 30 miles southwest of the village, during staging, molting, and migrating periods, but less so along the Point Lay or alternative Cape Sabine proposed transit routes (Figure 4). Larned *et al.* (1995) also found spectacled eiders concentrated about 30 miles southwest of Point Lay (Figure 4).

4.6. Steller's Eider (*Polysticta stelleri*)

4.6.1. ESA Status

Steller's eider is a small, bottom-foraging diving duck with breeding populations in Russia and the U.S. Because of significant population declines, the U.S. breeding population was listed as threatened in 1997, and critical habitat was designated in 2001. A recovery plan was finalized in 2002.

4.6.2. Biological Status

4.6.2.1. Abundance and Trend

While the Russian Pacific population of the Steller's eider numbers between 50,000 and 100,000, the U.S. breeding population may number only about 500 (USFWS 2001). The Alaska breeding population experienced a significant population decline in the late 20th Century (Quakenbush *et al.* 1999); low breeding density and great interannual variation in breeding locations make it difficult to determine if the population is beginning to stabilize or increase.

4.6.2.2. Distribution and Habitat Use

Steller's eiders arrive on their Siberian and Alaskan breeding grounds in late May and early June. In Alaska, breeding is confined to the Arctic Plain, with concentrations near Barrow, although nowhere is it common (Quakenbush *et al.* 2002). These eiders once nested on the Yukon-Kuskokwim Delta, but no significant breeding activity has been observed there for several decades (Kertell 1991, Flint and Herzog 1999). A historical breeding record (Dall 1873) from Unalaska Island is unsubstantiated, and there are no recent summer records for this location (Quakenbush *et al.* 2002). Males begin leaving the breeding grounds in early July, arriving at Southwest Alaska molting areas. Females remain on breeding grounds until broods have fledged, then migrate to molting areas or directly to wintering grounds farther south. Most Pacific populations of eiders molt within the lagoons along the Alaska Peninsula, especially Nelson and Izembek lagoons (Petersen 1981), although small numbers molt along the nearshore waters throughout Bristol Bay including northern Kuskokwim Bay where about 5,000 birds have been found (Larned and Tiplady 1996, Wilson *et al.* 2013). Based on limited satellite tracking data, Kuskokwim Shoals may be especially important for Alaska breeders (Rosenberg *et al.* 2011).

During the fall, U.S. Steller's eider populations are joined by thousands of unlisted Russian Steller's eiders along the north side of the Alaska Peninsula, where they undergo several weeks of molt (Jones 1965, Ward and Stehn 1989, Laubhan and Metzner 1999). In late November, they begin moving to overwintering areas in the Aleutian Islands, the south side of the Alaska Peninsula, Kodiak Archipelago, and Cook Inlet (Petersen 1981, USFWS 2002). A number of these birds overwinter in Unalaska Bay (Quakenbush *et al.* 2002). During April and May, nearly the entire population wintering in Alaska concentrates in Bristol and Kuskokwim bays as they wait for the sea ice to retreat and breeding ponds to thaw (USFWS 2001).

4.6.2.3. Feeding and Prey Selection

Steller's eiders are reported to consume a diverse diet of invertebrates, suggesting they are nonselective foragers (Petersen 1980, 1981; Metzner 1993; Bustnes and Systad 2001) whose main diet consists of bivalves, gastropods, and crustaceans such as crabs, shrimp, and amphipods (Vang Hirsh 1980, Goudie and Ankney 1986, Metzner 1993, Ouellet *et al.* 2013). As with other eiders, these small ducks winter in the northern latitudes probably at the edge of their energetic limits (Goudie and Ankney 1986).

4.6.2.4. Reproduction

Steller's eiders begin courtship and pairing in April often while still on the spring staging grounds (Fredrickson 2001). Nest-building begins within days of arriving on the nesting grounds, with egg-laying occurring mid-June (Quakenbush and Cochrane 1993). Clutches average about 6 eggs, which hatch 26 to 27 days after laying the first egg (Fredrickson 2001). There are no re-nesting opportunities in the short Arctic summer. In Russia, successful females and fledglings leave the nesting grounds in late August to mid-September (Solovieva 1997). Nesting success is highly variable in Alaska, and appears related to number of lemmings, an alternative prey for local nest predators (Quakenbush and Suydam 1999).

4.6.2.5. Natural Mortality

Maximum longevity is more than 20 years, and there is little information on major causes of adult mortality (Fredrickson 2001), although in Alaska, jaegers and common ravens have been identified as egg predators (Quakenbush and Suydam 1999). Presumably red and arctic foxes are potential predators of both nests and nesting adults.

4.6.3. Species Use of the Action Area

Steller's eiders nesting on the Coastal Plain of northern Alaska pass through the Action Area both on their way north from wintering grounds and south to molting areas. Specifically, northward bound Steller's eiders pass through the Action area during May when ice is usually still present and vessel, dredging, and landing construction activity would not yet begin. Males do not remain the summer on the breeding grounds, but rather begin leaving for molting areas in Southwest Alaska during late June and early July, probably passing through the Action Area on their way south. Females with broods do not begin leaving the breeding grounds until late August to mid-September. A telemetry study (Martin *et al. in prep*) of birds tagged near Barrow found that once leaving the nesting grounds, post-breeding birds linger along the coast between Wainwright and Dease Inlet, with some use in the coastal waters off Cape Sabine (Cape Beaufort) (MMS 2006), before migrating on to molting grounds in Southwest Alaska. Thus, Steller's

eiders may be passing through Action Area anytime between late June and late September. However, since the most recent population estimate for the Alaskan breeding population is only 576 birds (Stehn and Platte 2009), and their passage through the Action Area would be spread over 3 months, large numbers of Steller's eiders are not expected at any given time during the summer and early fall. We expect individual Steller's eiders to pass quickly through the Action Area, with the full population completing the transit over a protracted period.

5. CONSEQUENCES OF PROPOSED ACTION

Cully's proposed OSR has four activities with the potential to impact wildlife species under the jurisdiction of the USFWS or NMFS: Designation of travel lanes between Point Lay and Cape Sabine to offshore oil and gas prospects through the Ledyard Bay critical habitat area, designation of a OSR training area within the critical habitat area, channel dredging, and in-water construction of a landing ramp. These proposed activities could affect summering populations of listed marine wildlife by: 1) disturbing foraging and resting activities thereby reducing fitness and survival or acoustically affecting habitat and prey; 3) accidentally spilling oil leading to fouling of animals and habitat; and 4) attracting eiders to lighted vessels at night leading to collision with vessel superstructures. Each potential impact is addressed below.

5.1. Visual and Acoustical Disturbance

Disturbance concerns include visual disturbance from moving vessels at important wildlife concentration areas, especially of molting spectacled eiders inside the LBCHU, and marine mammal disturbance from underwater noise produced by the vessels traveling the corridor or operating within the training area. Visual and underwater disturbance of bowhead whales, bearded seals, and Steller's eiders is of little concern given the low encounter likelihood based on the low number of these species in the Action Area during the summer months.

Vessel traffic can disturb molting spectacled eiders, which may lead to an energetic imbalance from added stress and flushing (or swimming rapidly away if flying is impaired due to molt). As mentioned earlier, Goudie and Ankney (1986) stated that eiders might already be living near their energetic limits given they are small and winter in cold northern latitudes. Specifically establishing travel routes and training areas in places where records indicate molting eider use is low, reducing travel speeds or avoidance vectoring when eider groups are encountered, and "clearing" training areas of eiders (checking that the area is eider-free) before commencing training could mitigate for this effect.

Loud vessels can disrupt normal behaviors of ringed seals and walrus either through auditory or visual harassment. Disturbed animals may quit feeding, move away from feeding areas, display overt reactions including stampeding from terrestrial haulout areas (*e.g.*, walrus), or display other behaviors that expend undue energy potentially culminating in lowered fitness.

Most pinnipeds have peak sensitivities between 1 and 20 kilohertz (kHz) (National Research Council 2003), with phocids, such as ringed and harbor seals, peaking at over 10 kHz and showing good sensitivity to approximately 30 kHz (Wartzok and Ketten 1999). Relative to other pinnipeds, however, Pacific walrus are sensitive to lower frequency underwater sounds. Kastelein *et al.* (2002) found

maximum walrus sensitivity at 12 kHz with best sensitivity between 1 and 12 kHz. Unlike other pinnipeds, walrus hearing sensitivity drops sharply beyond 12 kHz. Also, Kastelein *et al.* (1996) found in-air walrus hearing to be less sensitive than sea lions and harbor seals.

When exposed to intense sounds, the mammalian ear will protect itself by decreasing its level of sensitivity (shifting the threshold) to these sounds. Stereocilia are the sound sensing organelles of the middle and inner ear. They are the "hairs" of the hair cells that convert sound wave energy to electrical signals. When sound intensity is low, the hairs will bend towards the incoming waves, increasing sensitivity. If the sound intensity is high, the hairs will bend away in an effort to reduce wave energy damage to the sensitive organelles, which includes a reduction in sensitivity. If the sound levels are loud enough to damage the hairs, the reduction in sensitivity will remain, resulting in a shift in hearing threshold. These threshold shifts can be temporary (temporary threshold shift [TTS]) or permanent (permanent threshold shift [PTS]) (Weilgart 2007) depending on the recovery ability of the stereocilia and connecting hair cells. Over-activation of hair cells can lead to fatigue or damage, which remains until cells are repaired or replaced.

Exposure to intense impulsive noises can disrupt and damage hearing mechanisms, leading to a threshold shift. However, these threshold shifts are generally temporary (TTS), as the hair cells have some ability to recover between and after the intermittent sound pulses. Long-term exposure to continuous noise, even noise of moderate intensity, can lead to a PTS. This is because the continuous wave energy does not allow hair cells to recover. If the exposure is long enough, the ability to replace damaged hair cells after the exposure has ceased is also reduced, and the threshold shift becomes permanent.

Anthropogenic sources of underwater impulsive noises that could lead to TTS include seismic surveys, pile driving, and blasting. However, the proposed vessel operation will not produce impulsive noises, so TTS concerns do not apply. The primary underwater noise associated with the proposed operations is the continuous cavitation noise produced from the vessel propellers. These continuous sounds for small ships have been measured at up to 171 decibels referenced at 1 micropascal in meters (root mean square) (dB re 1 µPa-m (rms)) at 1-meter source (broadband), and they are emitted at dominant frequencies of less than 5 kHz, and generally less than 1 kHz (Miles *et al.* 1987, Richardson *et al.* 1995, Simmonds *et al.* 2004). Cavitation noise is not a potential source for PTS as noise levels do not exceed 190 dB re 1 µPa-m (rms), and exposure durations are short. Also, as underwater hearing sensitivity in pinnipeds is greatest beyond 10 kHz, their effectiveness at hearing cavitation noise is already poor. Essentially, ringed seal and walrus exposure to continuous vessel noise is limited to the dive duration and the presence of the moving vessel. Mean dive durations for both walrus and ringed seals are less than 10 minutes (Kelly and Wartzok 1996, USFWS 2009), and bearded seal dive durations are probably similar. Thus, hearing loss in marine mammals is not of concern from the proposed vessel operations. No data currently exists on the physiological effect of anthropogenic noise on sea ducks and, like pinnipeds, the exposure duration (limited to the short dive period) from the moving vessels is far too short to induce impacts to hearing regardless. Dive durations for eiders are generally a minute or less (Heath *et al.* 2007, Evers *et al.* 2010) with longer rest periods between dives. Further, while disturbance thresholds from impulsive underwater noise have been established for marbled murrelets, and these same thresholds have been used to access potential seismic and pile driving effects on eiders, the noise generated by vessel operations is continuous, and there are no continuous noise criteria for birds.

Masking occurs when louder noises interfere with marine mammal vocalizations or ability to hear natural sounds in their environment (Richardson *et al.* 1995), which limit their ability to communicate or avoid predation or other natural hazards. Masking is of particular concern with baleen whales because low-frequency anthropogenic noises overlap with their communication frequencies, but less so for pinnipeds. Pinnipeds in general hear well in noisy backgrounds (Southall 2000), probably as an adaption to hearing when exposed to surf and other wave noise. Pacific walrus males produce loud underwater "songs" during the winter breeding season (Fay 1982, Schusterman and Reichmuth 2008), but apparently not at other times of the year, and there is no evidence of females or calves vocalizing underwater (Schusterman and Reichmuth 2008). Any communication-masking concerns would, therefore, be limited to times outside the summer vessel operation season. None of the other animals addressed in this assessment are known to communicate underwater.

Masking can also prevent marine animals from hearing approaching marine predators. However, predation from marine predators is not a primary mortality factor for summering walruses or diving sea ducks.

Continued exposure to low levels of noise and disturbance can lead to chronic stress, potentially further leading to stress-related responses such as immune system suppression, reproductive failure, and slowed growth, and an overall decline in fitness. Chronic stress is exposure to stressors that last for days or longer, and does not apply to a passing vessel. However, disturbance noise from a passing vessel (acute stress) can add to the overall stress budget (known as the allostatic load; Romero *et al.* 2009) of an individual animal contributing to a general distress and deleterious effects. The extent of masking associated with proposed OSR and crew transfer program is a function of the duration a vessel is within hearing proximity of an animal.

The planned vessel operations have some additive effect to the overall anthropogenic noise budget. But the number of weekly transits through the LBCHU is expected to be relatively small, and the dredging and pier construction activities would occur outside of and shoreward of the LBCHU and away from habitats used by local listed species.

There is little information on the reaction of pinnipeds to ships while in the water other than some anecdotal information that sea lions are often attracted to boats (Richardson *et al.* 1995). Most information on the reaction of pinnipeds to boats relate to disturbance of hauled out animals. Ringed and bearded seals haul out on ice, which would not be present during the open-water periods that the OSR program would be active. The greatest concern is disturbance of walrus that might be hauled out near Point Lay, possibly leading to a stampede event. Exactly where, if, and when walrus might haul out in a given year is not known, but the proposed transit corridors do not parallel the beaches where haulouts might occur. Vessel disturbance associated with the OSR program could be mitigated by imposing approach limits and timing restrictions as needed. Any aircraft activities tangentially associated with the OSR program could also be regulated such to avoid haul out distribution such as imposing the same overflight restrictions imposed by the FAA during the Point Lay walrus haul out event in 2014.

The proposed vessel operations will contribute to the overall noise budget of the marine environment of the Action Area, but that amount of noise is probably not significant given low number of actual transits. Overall, the proposed vessel operations program is unlikely to result in undue disturbance and stress increase in listed marine wildlife.

5.2. Accidental Oil Spill

5.2.1. Accidental and Incidental Oil Spill

A potential accidental oil spill caused by the OSR or crew vessels would be a small spill (hundreds of gallons) involving the rupture of a vessel fuel tank, usually as a result of a collision, sinking, fire, or running aground. Oil effects to marine wildlife that could result include skin contact with the oil, ingestion of oil, respiratory distress from hydrocarbon vapors, contaminated food sources, fouled feathers and fur, and displacement from feeding areas (Geraci 1990). Actual impacts would depend on the extent and duration of contact, and the characteristics (age) of the oil. Most likely, the effects of oil would be irritation to the respiratory membranes and absorption of hydrocarbons into the bloodstream (Geraci 1990). If a marine animal was present in the immediate area of fresh oil, it is possible that it could inhale enough vapors to affect its health. Inhalation of petroleum vapors can cause pneumonia in humans and animals due to large amounts of foreign material (vapors) entering the lungs (Lipscomb *et al.* 1994). Contaminated food sources and displacement from feeding areas also may occur as a result of an oil spill. Long-term ingestion of pollutants, including oil residues, could affect reproductive success, but data is lacking to determine how oil may fit into this scheme for marine wildlife. Seabirds are so dependent on the insulative value of their feathers that even a small amount of fouling can lead to death (Levy 1980, Burger and Fry 1993, O'Hara and Morandin 2010). In fact, it is generally accepted that feather fouling is the primary cause of mortality to seabirds in an oil spill event (Leighton 1991).

The likelihood of a small spill caused by OSR response or crew vehicles is low. Collision risk among vessels is very low given that the vessel traffic expected in the area would consist of the few OSR and crew vessels associated with the Devils Paw Prospect, all of which would be in radio contact. Further, because the Chukchi Sea shoreline is lined with sandy beach, and not rocks, a grounding resulting in vessel breakup is less likely. Other than weather, there are few navigational hazards in the Action Area to warrant an oil spill risk concern.

Incidental spills are chemicals spills which can be safely controlled at the time of release by shipboard personnel, do not have the potential to become an emergency within a short time, and are of limited quantity, exposure, and potential toxicity. Incidental spills also include normal vessel operational discharges such as release of ballast or bilge water that might contain oils or oily detergents from deck washdown operations. They further include accidental releases of small volumes of hydraulic fluids, motor fuels and oils, and other fluids used in normal ship operation, usually as a result of overfilling tanks. Incidental spills can also occur during vessel fueling at Point Lay. The accumulation of a number of small spills can lead to impaired marine waters, especially for confined, inland waters such as Kasegaluk Lagoon.

Incidental spill issues can best be avoided by conducting all OSR vessel maintenance and fueling out of the water (inside the storage facilities), limiting the time vessels are actually in-water moored in Point Lay (either returning the vessel to the offshore fleet or pulling it out of the water), and avoiding of over-water fueling of crew vessels at Point Lay. Transportation of marine vessel fuel to Point Lay would occur via aircraft.

5.2.2. Accidental Oil Spill Response

The proposed action would ensure that appropriate oil spill response personnel and equipment are staged in Point Lay. These resources would be used to in the unlikely event of an oil spill associated with OCS exploration to minimize the impacts on listed species in the Project Area and beyond in the LBCHU and Kasegaluk Lagoon. These resources would have a beneficial impact on these species in the unlikely event of an OCS oil spill.

5.3. Vessel Collision

There is anecdotal evidence that eiders, like other marine birds, are susceptible to nighttime disorientation from vessel lights leading to bird collision with vessel superstructures, especially during the adverse weather conditions (BOEM 2011). Based on required bird monitoring associated with recent OSC activities, BOEM has estimated bird encounter rates for small vessels at 11 birds per season (BOEM 2014). This rate applies to all birds. The vessel collision risk to eiders related to this project is low because: 1) the OSR and crew vessels are small with little superstructure to pose a collision risk, 2) most of the vessel operation will occur during the summer months when the number of storm events are low and number of daylight hours are high, and 3) the species most likely to be present, spectacled eiders, are using the Ledyard Bay area for molting, a period when the birds' ability to fly is greatly limited. However, if necessary, shielding or orienting onboard lights downward can further reduce the risk of eider collision with vessels (USFWS 2003), and travel during hours of darkness or other low visibility conditions could be restricted.

6. DIRECT EFFECTS

6.1. Bowhead Whale

Bowhead whales are not expected to be found in the Action Area during the summer when most vessel traffic, dredging operations, or landing construction would occur. During the fall migration, most bowhead whales migrate through the Chukchi Sea well west of the Action Area (Clarke *et al.* 2014). Bowhead whales do migrate through the Action Area during the spring migration, but before vessel, dredging, and landing operations can begin due to the presence of sea ice. Further, the harassment noise levels (>120 dB re 1 µPa-m [rms]) associated with the transiting vessels is not expected to extend more than about a half kilometer. This distance results in an ensonification zone of less than a square kilometer (0.8 square kilometer), an area too small to expect the presence of summering bowhead whales.

The determination is **No Effect** for bowhead whales, based on the rarity of this species in the Action Area during the summer operational period relative to the small ensonification zones associated with the transiting vessels.

6.2. Bearded Seal

Bearded seals are largely associated with sea ice and migrate through the Action Area in concert with the annual passage of the ice edge back and forth through the Chukchi Sea. Based on the ASAMM surveys conducted in the Chukchi Sea since 2008 (Clarke *et al.* 2014), a very few bearded seals are expected to

occur in the vicinity of the proposed transit routes during the summer months. While in the water, this species exhibits little response to passing vessels, other than often swimming away (Blees *et al.* 2010).

The determination is **May Affect, Not Likely to Adversely Affect** for bearded seals, based on the low density of this species in the Action Area during the summer operational period.

6.3. Ringed Seal

Even after seasonal sea ice has retreated from the Chukchi Sea, a significant number of ringed seals remain in these waters throughout the summer (Clarke *et al.* 2014). This species is likely to occasionally be encountered during vessel transits, but there is no compelling evidence that this species would be significantly harassed by these vessels given the relatively small ensonification zone (<0.8 square kilometers), and, while in the water, this species is relatively tolerant to passing vessels beyond occasionally swimming away from them (Richardson *et al.* 1995, Blees *et al.* 2010).

The determination is **May Affect, Not Likely to Adversely Affect** for ringed seals, based on the high likelihood of presence in the Action Area during the summer operational period, but low likelihood of the seals being exposed to noise levels of concern.

6.4. Pacific Walrus

Pacific walrus have recently become a major presence in the vicinity of Point Lay. Since 2010 (and excepting 2012), large numbers of walrus have been found hauling out near the village during the late summer and early fall. During years when terrestrial hauling out occurs on the U.S. Chukchi Sea coast, significant numbers of walrus are expected to occur in the vicinity of the proposed transit routes (Clarke *et al.* 2014). During years when they are not hauling out on Chukchi Sea beaches, much fewer numbers would be expected in the Action Area. Regardless, distance and timing restrictions to prevent disturbance of hauled out herds will be imposed as needed, and there is almost no information available showing that underwater vessel noise poses a significant acoustical disturbance threat to swimming walrus, especially given the small ensonification zone involved.

The determination is **May Affect, Not Likely to Adversely Affect** for Pacific walrus, based on the high likelihood of this species in the Action Area during the summer operational period, but the low likelihood of significant threat due to the relatively low noise concerns associated with the transiting vessels, and the mitigation measures that would be imposed to avoid disturbing hauled out herds.

6.5. Spectacled Eider

Establishing travel lanes and a training area with the LBCHU could have an effect on molting spectacled eiders by disturbing the birds during a critical life stage. These impacts could be limited with mitigation measures such as establishing travel routes and training areas in places where records indicate molting eider use is low, reducing travel speeds or avoidance vectoring when eider groups are encountered, and ensuring training areas are free of eiders before commencing training.

Establishing an OSR program at Point Lay provides a positive benefit to local marine life, including staging populations of spectacled eiders, by providing the ability to quickly respond to an oil spill event. While Stipulation 7 in BOEM's Oil and Gas Lease Sale 193 lease stipulations states that "exploration and delineation drilling operations will avoid travel within the Ledyard Bay Critical Habitat Area between

July 1 and November 15", it also states that hazing and OSR equipment should be located in Point Lay. The stipulation does not make it clear whether OSR vessels would fall *stricto sensu* under the category of exploration and drilling operations, but this biological assessment supports the contention that establishing an OSR program at Point Lay (including establishing travel lanes, training areas, and improving access to Point Lay) provides a greater measure of protection of the LBCHU than no OSR program, or one land-based farther away.

The determination is **May Affect, Not Likely to Adversely Affect** for spectacled eiders, based on the high likelihood of this species in the Action Area during the summer operational period, but the low likelihood of significant threat due to the relatively low noise concerns associated with the transiting vessels, and the mitigation measures that would be imposed to avoid disturbing molting eiders.

6.6. Steller's Eider

Steller's eiders could occur inside the Action Area during May, prior to the open water period, and anytime between late June and late September during the protracted migration south. Given that the small population recently estimated at 576 birds would pass through the Action Area during a 3-month period, eider encounters with OSR vessels is extremely remote.

The determination is **No Effect** for Steller's eiders for all potential risks based on the low density of the species in the action area during the summer and fall.

7. INDIRECT EFFECTS

Improving docking facilities and marine access to Point Lay could lead to additional development and industrial activity on the Chukchi Sea coast.

8. CUMULATIVE EFFECTS ANALYSIS

Establishing an OSR program at Point Lay provides an additional element of protection of the LBCHU in the advent of an oil spill associated with oil and gas activities at the Lease Sale 193 prospects. Exploration activities on those prospects are possible. The only currently approved Exploration Plan in the Chukchi Sea is on Shell's Burger Prospect, which is 92 miles from Point Lay. CPAI's Devil's Paw Prospect, for which no Exploration Plan is currently approved, is 80 miles away. BOEM has recently released a Draft Second Supplemental Environmental Impact Statement analyzing the impact of exploration and development on the leases issued in Lease Sale 193. BOEM expects little direct impact to marine and coastal birds, negligible impact on bowhead whales, bearded seals, and negligible to minor impact on ringed seals, and up to moderate impacts on walrus during preliminary exploration and development on the leases. The Proposed Action, with appropriate mitigation, would serve to limit impacts associated with OCS exploration and development by ensuring adequate spill response resources are staged in Point Lay to protect sensitive resources in LBCHU and Kasegaluk Lagoon. There are no other identified industrial activities onshore near Point Lay that have been identified.

9. DETERMINATION OF EFFECTS SUMMARY

A determination of effects for each species for the three evaluated risk categories is found in Table 2.

Table 2: Determination of effects for each ESA listed species potentially occurring the Action Area.

Species	Disturbance	Oil Spill	Collision	Overall
Bowhead Whale	NE	NE	NE	NE
Bearded Seal	NLAA	NE	NE	NLAA
Ringed Seal	NLAA	NE	NE	NLAA
Pacific Walrus	NLAA	NE	NE	NLAA
Yellow-billed Loon	NE	NE	NE	NE
Spectacled Eider	NE	NE	NLAA	NE
Steller's Eider	NE	NE	NLAA	NE

NE = No Effect
NLAA = Not Likely to Adversely Affect

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ENERGY PRODUCING STATES COALITION

December 4, 2014

Michael Routhier
Program Analysis Officer and Project Manager
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3801 Centerpoint Drive Ste. 500
Anchorage AK 99503-5820

Re: Draft Supplemental Impact Statement for Lease Sale 193

Dear Mr. Routhier:

We are the Energy Producing States Coalition (EPSC) - which represents legislators from 17 states including Alaska, Arizona, Arkansas, Colorado, Florida, Idaho, Indiana, Mississippi, Nevada, North Dakota, Ohio, Pennsylvania, Oklahoma, Texas, Utah, Wisconsin and Wyoming. On behalf of our membership, we write to express our strong support for oil and gas development in the Chukchi Sea. We also urge the Bureau of Ocean Energy Management (BOEM) to quickly finalize the Supplemental Environmental Impact Statement (SEIS) for Lease Sale 193, as well as uphold the tenets of Lease Sale 193 and allow long overdue exploration activities to proceed in the Arctic. The EPSC, which includes many legislators from Alaska, believes we must do more to develop the deep reservoir of our nation's natural resources in addition to improving and harmonizing often Byzantine federal regulatory policies concerning energy and the environment.

Lease Sale 193 has undergone exhaustive environmental review, and BOEM has once again recognized that exploration can be done with minimal environmental impact to the ecosystem of the Arctic. Oil and gas development in the Chukchi Sea can and should be done safely, and it is past time for the government to affirm Lease Sale 193. Allowing exploration to proceed is vital so all Americans can fully realize the energy and economic benefits increased domestic energy production affords. It defies common sense to deny or further delay these benefits to Alaskans and other Americans while Russia, Norway, Canada and others are moving to fully realize their benefits from Arctic energy.

Offshore oil and gas development is strongly supported by the people of Alaska and increased production will strengthen our nation's overall energy security. It will also be a boon for job creation both in Alaska and across the country, and production will generate significant government revenue at a time of continued economic uncertainty at home and turmoil abroad. Energy production on Alaska's Outer Continental Shelf (OCS) is critical to our nation's long-term energy supply, and federal estimates conservatively project it contains 27 billion barrels of oil and 132 trillion cubic feet of natural gas. Economic activity from the development of the

Chukchi and Beaufort Seas is estimated to provide over 54,000 jobs per year nationwide and revenue generated from the Chukchi Sea is estimated to be nearly $50 billion over the next 50 years. The benefits of energy production on Alaska's OCS cannot be overstated; development of our domestic energy resources is an asset for the entire economy.

Although outside the general scope of the SEIS, our membership remains concerned with the current direction of our nation's Arctic policy and the apparent disinterest in fully developing its resource potential. During the most recent national meeting of the Council of State Governments in Anchorage, we heard frustrating first-hand accounts from legislators representing Alaska Native communities over the extremely slow pace of leasing activities and a lack of direction from the federal government. This is in stark contrast to other nations in the Arctic who are clear-eyed about its resource and economic potential and are instead pursuing their long-term strategic objectives. Russia continues to use energy as a cudgel to blackmail the international community as it expropriates territory from sovereign nations and continues to frustrate our country's foreign policy interests at nearly every turn. This aggressive neighbor is making and staking vast claims in the Arctic with an intention to expand its hegemony in the region and could pose serious incursions on our nation's Exclusive Economic Zone. Other nations on the Arctic Council are expressing their claims of sovereignty and are deploying resources to ensure those claims are honored and upheld. China, an observer to this process, is eagerly watching for opportunities that it can potentially exploit to help harvest the bounty of natural resources the Arctic provides.

It appears that our State Department's greatest interest as it prepares for its chairmanship role of the Arctic Council in 2015 is to raise awareness of climate change rather than protecting our nation's sovereignty claims or developing a framework to counter aggressive actions by nations like Russia. An October 27, 2014 article in ClimateWire entitled, "State Dept. Outlines U.S. Climate Plans for Arctic Council Chairmanship" referenced a presentation given to Council members where US officials outlined its first "thematic area" would be addressing the impacts of climate change.[1] While we do not want to diminish the important public policy debate on the issue of climate, there are very real and immediate pressing threats that we must address now which demand more than just cursory attention. Our two-year chair of the Arctic Council needs to leverage US strategic economic and foreign policy interests and must not simply be a sounding board for feel-good environmental policy objectives.

It is time for action on Lease Sale 193 and the continued obstruction of the SEIS by extreme opposition groups should no longer trump the nationwide benefits our country would enjoy. In order to achieve greater future price stability for consumers, America needs more energy – not less. Companies have also invested billions of dollars in private capital and sent bonus bids back to the federal treasury only to experience continued delays. Steps must be taken now to ensure we have access to energy resources in the long term so all Americans will benefit from

[1] "State Dept. outlines U.S. climate plans for Arctic Council chairmanship." Christa Marshall, ClimateWire. October 27, 2014. http://www.eenews.net/climatewire/stories/1060007910/search?keyword=arctic+council

the security of a stable supply of domestic fuel for decades to come. For that reason, EPSC strongly supports affirmation of Lease Sale 193.

Upon conclusion of this public comment period, we respectfully request that BOEM quickly finalize the SEIS and allow leaseholders to move forward with planned exploration and production activities. We appreciate BOEM's attention to this important matter and look forward to safe and responsible energy production in the Chukchi Sea.

Sincerely,

Sen. Cathy Giessel
Alaska
EPSC Chair

Sen. Chuck Winder
Idaho
EPSC Chair-elect

Rep. Bob Skarphol
North Dakota
EPSC Executive Committee

Rep. Steve Handy
Utah
EPSC Executive Committee

Sen. Drew Perkins
Wyoming
EPSC Executive Committee

BOEM-2014-0078-0019

NORTHEAST OHIO
Trade & Economic Consortium

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November 25, 2014

Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

Re: Comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Mr. Routhier,

On behalf of the Northeast Ohio Trade and Economic Consortium (NEOTEC), we are writing to express support for the Bureau of Ocean and Energy Management (BOEM) Draft Supplemental Environmental Impact Statement (SEIS) and ask that BOEM expeditiously issue a Record of Decision (ROD). This will allow companies to move forward to conduct oil and natural gas exploration and development in the Chukchi Sea in 2015.

Domestic oil and natural gas exploration and production are critical to America's future and to states such as Ohio. If we can open more area in Alaska's Outer Continental Shelf (OCS), it will increase Ohio's potential to grow our energy economy.

Alaska's OCS has one of our nation's largest sources of oil and natural gas. In addition to increasing our energy security and supply, drilling in Alaska can lead to job growth in Ohio and throughout the United States. Ohio has a strong gas and oil industry sector. We are a leader in steel and pipe manufacture, compressors, transportation, polymers, energy innovation and more. Ohio companies can support Arctic energy exploration and production.

We ask that the BOEM finalize this SEIS, following the deadline for draft comments, and issuing a Record of Decision that enables energy companies to begin their work in 2015.

Sincerely,

Ronald W. DeBarr
President & CEO – NEOTEC
Kent, Ohio

PUBLIC SUBMISSION

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0211
Comment from Michael Kearns, National Ocean Industries Association

Submitter Information

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Organization: National Ocean Industries Association

General Comment

Edited here for length. See attachment for full comments.

With this letter, the National Ocean Industries Association (NOIA) wishes to submit comments regarding the Bureau of Ocean Energy Managements (BOEM) Draft Second Supplemental Environmental Impact Statement (DSEIS) for the Chukchi Sea Lease Sale 193, Alaska OCS Region, Chukchi Sea Planning Area, 79 FR 66401 (November 7, 2014) Docket No. BOEM-2014-0078.

The Arctic OCS includes critically important hydrocarbon producing areas like the Chukchi and Beaufort Seas off Alaska, where expertise and technology can be used to potentially make significant discoveries of energy resources and increase our nations energy security. In fact, few areas of the world are thought to contain more undiscovered oil and natural gas resources than the Arctic. Regular, predictable lease sales in these Planning Areas are needed to help ensure high participation in future lease sales, new federal revenues from lease bonuses, and continued offshore exploration and production.

The time is now upon us for the completion of the planning process for Lease Sale 193. Doing so is in the nations best interest. The U.S. Energy Information Agencys 2014 Energy Outlook, indicates that oil and natural gas will be a key component of the U.S. energy mix and is projected to still

account for well over half of all domestic energy produced in 2040. It is therefore in the nations best interest to safely produce as much domestic energy as possible.

Also important is that new sources of oil be found on the North Slope of Alaska to maintain the viability of the Trans- Alaska Pipeline System. In 1988 Alaskas North Slope was producing over 2 million barrels per day or roughly 25% of the U.S. domestic crude oil production. Current North Slope production has declined to under 500,000 barrels per day. Should this decline continue unabated, the viability of the Trans-Alaska Pipeline will be threatened, and with it the flow of existing production to the Lower 48. Drilling of new offshore prospects and development of the discoveries that may be found on them is essential to slowing and reversing the current, declining trend in Alaskan oil production.

The potential in the region is substantial. The Chukchi Sea alone was last estimated by MMS/BOEM in 2006 to contain 15.38 BBO, 76.77 TCFG, or a total of 29.04 BBOE possessing a greater hydrocarbon resource potential than any other undeveloped U.S. energy basin. The Beaufort Sea, while smaller, nevertheless provides among the largest undiscovered resource accumulations in the U.S. Together, the oil and natural gas resource potential represented by the Chukchi and Beaufort Seas exceeds the combined resource estimates for the Atlantic and Pacific OCS.

These significant resources can be brought to market safely, even given the challenging operating conditions of the Arctic region. The offshore industry has a long and rich Arctic operations experience, and technological evolution as lessons are applied from project to project equip the oil and natural gas industry to be able to carry out operations in the Chukchi Sea and elsewhere in the Arctic in a safe and environmentally responsible manner. This same experience demonstrates that industry can operate in a manner that enables the protection of habitat, wildlife, and subsistence resources, and that is respectful of the way of life and the communities of the people living in the region.

Major safety and environmental performance changes have occurred since the Macondo Incident in 2010. In the last few years, the oil and natural gas industry has worked both independently and with regulatory agencies to enhance the safety of offshore operations. Many industry standards were revised, enhanced or newly created to cover areas that include well design, cementing, and operator/contractor interaction; blowout prevention equipment design, operation, repair and maintenance, and associated control systems; and, subsea equipment interfaces with remotely-operated vehicles and well capping equipment.

The offshore oil and gas industry has a long track record of safely producing vitally needed energy resources from increasingly difficult to access regions, all while continually improving safety processes and technological developments. The resource potential in the Arctic is significant and the nations needs are expanding. Taken together, the course should be clear: the DSEIS for Lease Sale 193 must move forward.

Thank you for considering this letter in your determination of the completeness and suitability of the DSEIS to address the potential environmental effects of potential oil and gas activities associated with Lease Sale 193. If you have any questions, please do not hesitate to contact me.

Attachments

Lease Sale 193 Comments 141222

file:///S|/...0List%2022-12-2014%2016-58-22-818/Document%20List%2022-12-2014%2016-58-22-818_docs/BOEM-2014-0078-0211.html[12/22/2014 1:34:15 PM]

NOIA

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December 22, 2014

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Abigail Hopper
Director, Bureau of Ocean Energy Management
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Washington, D.C. 20240

Submitted electronically via regulations.gov

Re: Docket No. BOEM-2014-0078

Dear Sirs:

With this letter, the National Ocean Industries Association (NOIA) wishes to submit comments regarding the Bureau of Ocean Energy Management's ("BOEM") Draft Second Supplemental Environmental Impact Statement (DSEIS) for the Chukchi Sea Lease Sale 193, Alaska OCS Region, Chukchi Sea Planning Area, 79 FR 66401 (November 7, 2014) Docket No. BOEM-2014-0078.

NOIA, founded in 1972, represents more than 320 companies among all segments of the offshore industry with an interest in the exploration and production of both traditional and renewable energy resources on the nation's outer continental shelf (OCS). NOIA's mission is to secure reliable access and a fair regulatory and economic environment for the companies that develop the nation's valuable offshore energy resources in an environmentally responsible manner.

The Arctic OCS includes critically important hydrocarbon producing areas like the Chukchi and Beaufort Seas off Alaska, where expertise and technology can be used to potentially make significant discoveries of energy resources and increase our nation's energy security. In fact, few areas of the world are thought to contain more undiscovered oil and natural gas resources than the Arctic. Regular, predictable lease sales in these Planning Areas are needed to help ensure high participation in future lease sales, new federal revenues from lease bonuses, and continued offshore exploration and production.

The time is now upon us for the completion of the planning process for Lease Sale 193. Doing so is in the nation's best interest. The U.S. Energy Information Agency's 2014 Energy Outlook, indicates that oil and natural gas will be a key component of the U.S. energy mix and is projected to still account for well over half of all domestic energy produced in 2040. It is therefore in the nation's best interest to safely produce as much domestic energy as possible.

Also important is that new sources of oil be found on the North Slope of Alaska to maintain the viability of the Trans- Alaska Pipeline System. In 1988 Alaska's North Slope was producing over 2 million barrels per day – or roughly 25% of the U.S. domestic crude oil production. Current North Slope production has declined to under 500,000 barrels per day. Should this decline continue unabated, the viability of the Trans-Alaska Pipeline will be threatened, and with it the flow of existing production to the Lower 48. Drilling of new offshore prospects and development of the discoveries that may be found on them is essential to slowing and reversing the current, declining trend in Alaskan oil production.

The potential in the region is substantial. The Chukchi Sea alone was last estimated by MMS/BOEM in 2006 to contain 15.38 BBO, 76.77 TCFG, or a total of 29.04 BBOE – possessing a greater hydrocarbon resource potential than any other undeveloped U.S. energy basin. The Beaufort Sea, while smaller, nevertheless provides among the largest undiscovered resource accumulations in the U.S. Together, the oil and natural gas resource potential represented by the Chukchi and Beaufort Seas exceeds the combined resource estimates for the Atlantic and Pacific OCS.

These significant resources can be brought to market safely, even given the challenging operating conditions of the Arctic region. The offshore industry has a long and rich Arctic operations experience, and technological evolution as lessons are applied from project to project equip the oil and natural gas industry to be able to carry out operations in the Chukchi Sea and elsewhere in the Arctic in a safe and environmentally responsible manner. This same experience demonstrates that industry can operate in a manner that enables the protection of habitat, wildlife, and subsistence resources, and that is respectful of the way of life and the communities of the people living in the region.

Major safety and environmental performance changes have occurred since the Macondo Incident in 2010. In the last few years, the oil and natural gas industry has worked both independently and with regulatory agencies to enhance the safety of offshore operations. Many industry standards were revised, enhanced or newly created to cover areas that include well design, cementing, and operator/contractor interaction; blowout prevention equipment design, operation, repair and maintenance, and associated control systems; and, subsea equipment interfaces with remotely-operated vehicles and well capping equipment.

Progress in Arctic design and operating standards has kept pace with these developments in technologies and procedures. These standards ensure the use of best practices and adhere to the same philosophies of management systems for protection of human health, safety and the

environment used in other operating environments while specifically addressing the risks associated with the Arctic.

Recent efforts to enable safe and environmentally sound Arctic operations have included:

- 3D seismic on ice;
- Acoustic monitoring programs to detect and track marine mammals and subsequent sound mitigation measures;
- Improvements in well design and well control;
- Reduction of drilling sound and use of drones (pilotless aircraft systems) for surveillance; and
- The newly developed standard for safe and reliable design of offshore structures in ice promulgated by the International Organization for Standardization (ISO).

In addition to the above, several international oil and gas companies with substantial experience with Arctic operations are collaborating on a program of research to improve Arctic spill response under the auspices of the IOGP (formerly International Association of Oil and Gas Producers) as participants in the Arctic Oil Spill Response Technology Joint Industry Program ("JIP").

The offshore oil and gas industry has a long track record of safely producing vitally needed energy resources from increasingly difficult to access regions, all while continually improving safety processes and technological developments. The resource potential in the Arctic is significant and the nation's needs are expanding. Taken together, the course should be clear: the DSEIS for Lease Sale 193 must move forward.

Thank you for considering this letter in your determination of the completeness and suitability of the DSEIS to address the potential environmental effects of potential oil and gas activities associated with Lease Sale 193. If you have any questions, please do not hesitate to contact me.

Sincerely,

Michael Kearns
Vice President
Government Relations

Shell Exploration & Production

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Bureau of Ocean Energy Management
ATTN: Walter Cruickshank, Acting Director
1849 C Street, NW
Washington, D.C. 20240

Via the Federal eRulemaking Portal

December 22, 2014

Re: Comments on the Lease Sale 193 Draft Second Supplemental Environmental Impact Statement

Shell Exploration & Production Company on behalf of Shell Offshore Inc. and Shell Gulf of Mexico Inc. (individually and collectively, Shell), the largest holder of Outer Continental Shelf (OCS) leases in the Chukchi Sea, appreciates the opportunity to comment on the Bureau of Ocean Energy Management's (BOEM) Draft Second Supplemental Environmental Impact Statement for Lease Sale 193 (Draft Second SEIS).

The Chukchi Sea is believed to be one of the greatest remaining untapped oil and gas resources in the United States and could, if developed, contribute significantly to the national energy supply. Shell's presence in the Chukchi Sea OCS dates back to the late 1980s, when Shell successfully drilled four exploration wells at its Burger, Klondike, Crackerjack, and Popcorn prospects. The Chukchi Sea OCS has played a significant role in Shell's Arctic business strategy, as demonstrated by its 2008 purchase of 275 Chukchi Sea leases for approximately $2.1 billion. Since 2008, Shell has invested significantly more resources to plan, permit, and execute its exploration plans on these lease tracts, and to ensure that all activity will be done in a safe, effective, and environmentally responsible manner.

BOEM's Lease Sale 193 program has been in litigation since the 2008 lease sale. Because of this litigation, operations on Shell's leases have twice been suspended by the Department of the Interior. The Draft Second SEIS results from the most recent decision in the ongoing Lease Sale 193 litigation. In January 2014, the Ninth Circuit upheld BOEM's NEPA analysis on all but one issue: BOEM's failure to adequately explain the derivation of its future one billion barrel (Bbbl) oil production scenario and the resulting environmental impacts associated with future production.

On remand, BOEM has adeptly addressed the single issue identified by the Ninth Circuit by revising its future oil production scenario and the resulting environmental impacts. BOEM also fulfilled its NEPA statutory duty by identifying and analyzing significant new circumstances or information arising since the 2011 Lease Sale SEIS was issued, e.g., a new exploration scenario.

The Draft Second SEIS provides a robust analysis of the potential production scenario that could result based upon the most recent government estimates of undiscovered technically and economically recoverable reserves within the leased blocks, and the agency's expert assessment of resource development in frontier areas. First, BOEM revised its oil production scenario by repeatedly making assumptions that resulted in the highest estimate of potential oil and gas activities that could occur from the Proposed Action. Although BOEM determined the most likely outcome from Lease Sale 193 was "zero production," it nonetheless assumed that if development were to occur, one anchor field containing 2.9 Bbbl of recoverable oil and one satellite field containing 1.4 Bbbl of recoverable oil could potentially be developed, resulting in a total of 4.3 Bbbl. BOEM explained the barriers to development and production, and why this new scenario is optimistic. Second, BOEM addressed the Ninth Circuit's concerns over the relationship between production levels and oil prices. BOEM explained that although the future price of oil was a factor in developing its production scenario, in the Arctic there is only a weak connection between oil production and alternative specifications of oil prices. BOEM's revised scenario is driven instead by the factors noted above. BOEM's revised 4.3 Bbbl production estimate and corresponding environmental effects analysis are based on the best available data, fall squarely within BOEM's area of scientific and technical expertise, and resolve the Ninth Circuit's concerns over the agency's original oil production estimate.

After developing a new exploration and production scenario, BOEM identified the relevant environmental issues and evaluated the anticipated direct, indirect, and cumulative impacts associated with the revised scenarios. Overall, the Draft Second SEIS is a comprehensive analysis and is impressive in its scope and depth. BOEM is to be commended on its approach and careful attention to the single issue raised by the Ninth Circuit, and its adept treatment of the programmatic realities and significant new circumstances and information now available.

Shell recognizes that the document is a draft. Shell's comments highlight a few areas where Shell believes BOEM could further improve its Second SEIS to better communicate the breadth of BOEM's substantive analysis to decision-makers and the public and to clarify some language in the draft that is currently ambiguous. Shell has structured its comments to facilitate the timely completion of the Final Second SEIS by late February 2015, as anticipated in the government's Fourth Bimonthly Status Report filed with the United States District Court for the District of Alaska.

In this letter, Shell presents general comments under four separate themes.

1) **BOEM's Reliance on Prior Environmental Analyses to Support its Environmental Effects Analyses in the Draft Second SEIS is Appropriate and Proper.**

BOEM appropriately relies on prior NEPA documents produced over the years to support Lease Sale193 activities and other activities within the Alaska OCS. BOEM's "tiering" approach is explicitly encouraged by the relevant NEPA regulations. *See* 40 C.F.R. §§ 1502.20, 1502.21; *see also* 43 C.F.R. §§ 46.120, 46.140. This approach helps focus the public and decision-maker on new matters, those of true significance, and any changes and new information not previously considered.

The federal government and private sector have generated a substantial body of scientific literature and environmental analyses to better understand the effects of human activities (e.g., oil and gas activities) within the Chukchi and Beaufort Seas. In the Draft Second SEIS, BOEM has identified many recent environmental studies, scientific papers, and other analyses to support the environmental effects discussion. Shell agrees with this rigorous approach. To assist the public's understanding of the scope of BOEM's analysis, Shell recommends that BOEM describe in more detail the significance of these documents, expand on how the new research supports the agency's conclusions (and more

prominently highlight areas where the agency's environmental impact conclusions have changed as a result of the new information), and, where appropriate, include citations to the applicable studies within the environmental resource sections.

In the Draft Second SEIS, BOEM reaches many of the same conclusions as the 2011 SEIS, and relies on much of the same data and analysis. That is to be expected given that the changes in this Draft Second SEIS are relatively modest (i.e., the exploration and production scenario) and the most recent NEPA analysis was completed just three years ago. To clarify what is new in *this* supplemental analysis, Shell suggests that BOEM include a description of its general approach in the Final Second SEIS, i.e., when BOEM restates its previous analyses or merely summarizes earlier data and conclusions in support of focused discussion on new information and circumstances. This discussion could explain why BOEM has adopted the chosen approach, identify those sections which remain largely unchanged and include a list of the key documents BOEM intends to tier to or incorporate by reference. To assist readers evaluating the agency's analysis of the lease sale over three NEPA documents (the 2007 FEIS, the 2011 SEIS, and the forthcoming Final Second SEIS), Shell advises BOEM to discuss whether – and which – past analyses are applicable to, for example, the new exploration, development, production, and decommissioning scenarios and the VLOS analyses described in Chapters 2 and 4, respectively and how they support the new effects determinations.

2) **BOEM has Identified the Relevant Environmental Issues and has Considered All Foreseeable Impacts Resulting from the Lease Sale 193 Action.**

Overall, Shell believes that the Draft Second SEIS appropriately identifies and evaluates the significant environmental issues implicated by the new exploration and production scenarios. Several issues, however, could benefit from greater attention.

The Draft Second SEIS indicates that BOEM used different "impacts scale" criteria to guide its analysis, an approach that is somewhat different than that taken in recent NEPA documents, such as the 2011 Environmental Assessments supporting the agency's decisions to approve Shell's Exploration Plans. To assist the public's understanding of the current analysis, Shell suggests that BOEM expand its discussion of the "impacts scale" used in this analysis with an explanation of why the chosen "impacts scale" is appropriate for a programmatic lease sale analysis, and a description of its beneficial impact on the rigor of the agency's review.

BOEM has also made technical revisions to its "approach to assessment" for certain environmental factors, e.g., Very Large Oil Spill (VLOS) and Oil Spill Risk Analysis (OSRA). For example, changes in the OSRA runs since the 2011 SEIS include a decrease in the number of hypothetical launch areas (LAs) from 13 to 6, different Environmental Resource Areas (ERAs), and other spill modeling parameters in Appendix A. To better explain these changes to the public, Shell suggests that BOEM discuss in more detail what changes were made in the Draft Second SEIS, why the agency made these changes to its approach, whether prior analyses are applicable to the new scenarios, and the impacts of these changes on the ultimate analysis.

3) **BOEM's Air Quality Assessment Properly Analyzes Air Quality Impacts Based Upon BOEM's Air Quality Regulatory Program.**

BOEM's conclusions related to the air quality effects that may occur as a result of the lease sale are supported by data, modeling, and analyses from the key environmental reviews of this action, including the 2007 EIS and the 2011 SEIS. Shell agrees with BOEM that, as a result of the lease

auction being closed, the scope of analysis is better defined than it was for the earlier environmental reviews.

On the issue of air quality, in particular, Shell believes BOEM should take the opportunity presented by the Final Second SEIS to expand on its explanation of the implications of Congress's recent decision to shift OCS air quality regulation authority from the U.S. Environmental Protection Agency (EPA) to BOEM. The 2007 EIS and 2011 SEIS for Lease Sale 193 were both drafted when EPA had jurisdiction over sources of air emissions operating on the OCS, and BOEM's NEPA analysis properly deferred some of the detailed air quality analysis to the EPA's subsequent independent review under its air quality programs. The jurisdictional change from EPA to BOEM is a significant one that merits a full discussion in the Final Second SEIS to explain to decision-makers and the public (i) how BOEM will regulate air quality emissions during OCS activities in the Chukchi Sea, and (ii) the implications of the agency's Air Quality Regulatory Program (AQRP) for the NEPA analysis at the lease sale stage.

In addition, BOEM's discussion of air quality impacts would be improved if the Final Second SEIS describes how the new regulatory framework assures there will be no significant adverse air quality impacts in the context of NEPA. Specifically, Shell believes this discussion could be expanded to demonstrate how BOEM's AQRP ensures protection of human health and the environment, and assures compliance with the applicable requirements of the Clean Air Act.

4) **Shell Encourages BOEM to Include a More Robust Discussion of Mitigation Measures.**

NEPA requires that federal agencies include a "reasonably complete discussion" of possible mitigation measures as part of an EIS. BOEM states in the Draft Second SEIS that it "did not identify any additional measures [beyond those identified in the 2007 FEIS] specific to the natural gas development and production scenario evaluated in the 2011 SEIS, or the Lease Sale 193 Exploration and Development Scenario in this Lease Sale 193 Draft Second EIS."

While BOEM has concluded that additional mitigation is not necessary for Lease Sale 193, Shell encourages BOEM to include a more robust explanation in the Final Second SEIS of what mitigation measures are currently in place, their effectiveness in light of BOEM's analysis of significant new circumstances or information since the 2011 Lease Sale SEIS, and why the agency concludes that additional mitigation is unnecessary. BOEM should clarify whether and how the new information and analysis considered by the agency and the changes in the exploration, development, production, and decommissioning scenarios result in impacts that are different from the impacts described in the 2007 FEIS and 2011 SEIS and why BOEM has determined no additional mitigation is required. This discussion could include, e.g., the mitigation measures contemplated in the National Marine Fisheries Service's 2013 Biological Opinion for Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas. Shell anticipates any new discussion would clarify how the existing mitigation measures in place are appropriate and adequate protection at this level of the Outer Continental Shelf Lands Act analysis, and that site-specific and project-specific measures are more appropriately developed and imposed when the NEPA analysis is prepared for a future Exploration Plan, existing Exploration Plan Revision and with commercial exploration success, a Development and Production Plan.

Finally, to further clarify BOEM's assumptions regarding mitigation measures, Shell suggests that BOEM revisit its discussions of mitigation throughout Chapter 4 to clarify when mitigation measures are incorporated in the agency's impact analysis and conclusions.

* * *

Shell again commends BOEM for its well-developed Draft Second SEIS. Shell respectfully requests that BOEM consider the comments provided herein and address them in the Final Second SEIS for Lease Sale 193 as appropriate. If you have any questions please contact Susan Childs at (907) 646-7112.

Sincerely,

Peter E. Slaiby
Vice President, Shell Alaska

Statoil

December 22, 2014

Michael Routhier
Program Analysis Officer and Project Manager
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Walter D. Cruickshank, Ph.D.
Acting Director
Bureau of Ocean Energy Management
1849 C Street, NW
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Submitted electronically via Regulations.gov

RE: Docket No. BOEM-2014-0078

Dear Sirs:

Statoil USA E & P Inc. ("Statoil"), on behalf of all Statoil entities who are leaseholders in the OCS, appreciates the opportunity to provide comments on the U.S. Department of the Interior Bureau of Ocean Energy Management's (BOEM's) Draft Second Supplemental Environmental Impact Statement (DSEIS) for the Chukchi Sea Lease Sale 193, Alaska OCSS Region, Chukchi Sea Planning Area, 79 FR 66401 (November 7, 2013) Docket No. BOEM-2014-0078.

Statoil and its affiliates comprise an international energy enterprise with operations in 33 countries. We have more than forty years of experience from oil and gas production on the Norwegian Continental Shelf, where we operate 80% of the production. Statoil is the largest deepwater offshore operator in the world, and we are committed to accommodating the world's energy needs in a responsible manner, applying technology, and creating innovative business solutions.

Statoil began building its upstream petroleum assets in the US market in 2002, and we have invested billions over the past 10 years to grow that upstream business. Statoil is a significant leaseholder in the deepwater Gulf of Mexico and holds significant positions in the Alaska Chukchi Sea.

Statoil believes in the prudent development of the US Arctic by adherence to Federal, State and local governments' policies, rules and regulations, striving for safe and environmentally responsible operations. We support the continuation of the 2007 Lease Stipulations because these effectively address and mitigate any potential adverse effects from exploration and production activities carried out under Lease Sale 193. The list of issues provided in the DSEIS related to activities in the Chukchi Sea under Sale 193 adequately describes concerns associated with exploration and production activities in the sale planning area. This list of issues is the result of many years of scoping for OCS lease sale evaluations, notably, the 2007 FEIS process for the then-proposed sale, and additional reviews conducted for the 2011 SEIS

BOEM-2014-0078-0242

following the holding of the sale and the issuance of leases under the sale. No additional analysis is necessary to satisfy the requirements of NEPA for Sale 193. Finally, the Resource Assessment carried out by BOEM and the Department of Interior for this DSEIS, and the Production Scenarios and the description of foreseeable Prospect Development that have been prepared with reference to the Resource Assessment are reasonable. Therefore, the planning process for Sale 193 should be deemed complete, Sale 193 authorized as final, and the leases issued under Sale 193 declared valid and in full force and effect.

Statoil appreciates the opportunity to provide input to the Bureau on this very important issue to the industry.

Regards,

William H. Schoellhorn
Exploration Director

BOEM-2014-0078-0030

TOTAL
COMMITTED TO BETTER ENERGY

November 21, 2014

Michael Routhier
Program Analysis Officer and Project Manager
Bureau of Ocean Energy Management, Alaska OCS Region
3801 Centerpoint Drive Ste. 500
Anchorage AK 99503-5820

Re: Supplemental Impact Statement for Lease Sale 193

Dear Mr. Routhier:

On behalf of TOTAL E&P USA, INC, I would like to express my strong support for oil and gas development in the Chukchi Sea and to urge the Bureau of Ocean Energy Management (BOEM) to finalize expeditiously the Supplemental Environmental Impact Statement for Lease Sale 193, re-affirm Lease Sale 193 and allow exploration activities to proceed.

Lease Sale 193 has undergone exhaustive environmental review, and BOEM once again has acknowledged that exploration can be done with minimal environmental impact. Oil and gas development in the Chukchi Sea can and should be done safely, and it is past time for the government to affirm Lease Sale 193 and allow exploration to proceed so that Americans can fully realize the energy and economic benefits increased domestic energy production can bring.

Offshore oil and gas development in Alaska will strengthen our energy security, create jobs in Alaska and across the country and generate significant government revenue. With a conservatively estimated 27 billion barrels of oil and 132 trillion cubic feet of natural gas, energy production on Alaska's OCS is critical to our country's long-term energy supply. It is estimated that economic activity from the development of the Chukchi and Beaufort Seas would create an annual average of 54,700 jobs nationwide. Government revenue generated from the Chukchi Sea is estimated to be nearly $50 billion over the next fifty years. The benefits of energy production on Alaska's OCS cannot be overstated; development of our domestic energy resources is an asset to the entire economy.

In order to achieve greater price stability for consumers, America needs more energy – not less. Taking steps now to ensure that we have access to energy resources in the long term will ensure Americans will benefit from the security of a stable supply of American fuel for decades. For that reason, TOTAL E&P USA, INC. strongly supports affirmation of Lease Sale 193.

Upon conclusion of this public comment period, I respectfully request that BOEM quickly finalize the SEIS and allow leaseholders to move forward with planned exploration and production. I appreciate BOEM's attention to this important matter and look forward to safe and responsible energy production in the Chukchi Sea.

Sincerely,

Thomas W. Ryan
Vice President & General Counsel

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Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0009
Comment from Kevin Winter, NA

Submitter Information

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Organization: NA

General Comment

I am writing to urge you to protect the wildlife and people of the Chukchi Sea from risky, reckless oil drilling, and to take a step away from dirty fossil fuels, by deciding to reject oil and gas lease sale 193. Last January, the Ninth Circuit Appeals Court declared the lease sale unlawful, requiring you to redo the analysis of environmental effects of drilling in the sea and reconsider whether the region should be open to drilling at all. This is the second time the massive offshore oil and gas sale, which was rushed through based on poor science and arbitrary assumptions, has been sent back by the courts. Please do not make the mistake of opening the Chukchi Sea to oil drilling a third time.

The Chukchi Sea is home to irreplaceable wildlife, including polar bears, walruses, bowhead whales, ice seals, and dozens of bird species, and to a thriving indigenous culture. The sea already is under tremendous stress from climate change. Just this fall, some 35,000 walruses were forced ashore in a crowded coastal haul-out because of dramatic sea ice melt, placing them far from food sources and exposing mothers and calves to the risk of trampling from stampedes.

Drilling and other industrial oil and gas activities in the Chukchi Sea put Arctic people and

wildlife at risk from noise and disturbance, air and water pollution, and oil spills. The draft supplemental EIS demonstrates clearly that the effects of leasing in the Chukchi Sea could be catastrophic. For example, in the EIS, the Department of the Interior acknowledges that there is a 75 percent chance that one or more large oil spills would occur if the leases are developed. There is no way effectively to clean up or contain an oil spill in Arctic Ocean conditions. In the face of these risks and the myriad other serious adverse effects the document acknowledges would accompany oil development even in the absence of an oil spill, the choice is clear--you must not affirm the lease sale.

Exploring for and developing oil in the Chukchi Sea also puts the climate at risk. As President Obama has recognized, much of the world's fossil fuels will have to remain in the ground, undeveloped, if we are to have even a chance of reaching our climate goals. Drilling in the rapidly melting Arctic Ocean for more oil that will only further heat the planet adds climate insult to climate injury. Yet the draft EIS does not even consider the climate impacts of burning the oil produced as a result of the sale. It should. The lease sale decision is a golden opportunity for the Obama administration to show climate leadership by deciding to leave dirty Arctic oil in the ground by keeping the Chukchi Sea off limits to drilling.

Please reject Chukchi Sea lease sale 193.

BOEM-2014-0078-0013

FIRST AVENUE SUITES LLC

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November 21, 2014

Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

Re: Comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Dr. Routhier,

I support the Bureau of Ocean and Energy Management (BOEM) Draft Supplemental Environmental Impact Statement (SEIS) and ask that BOEM expeditiously issue a Record of Decision (ROD) so that companies can conduct oil and natural gas exploration and development in the Chukchi Sea in 2015.

The United States has become a true competitor in the world oil market and is the world's largest producer of natural gas, bringing our nation greater prosperity and security. In order for us to maintain this position, however, we need to continually seek opportunities to develop new sources of oil and natural gas. This opportunity lies in the Arctic.

The United States should not allow any delays, and send a signal to the world that we are going to remain an energy and economic leader by allowing companies to explore for and develop U.S. Arctic oil and natural gas.

I ask that you do not extend the deadline for Public Comments or allow any other actions to prevent BOEM from meeting its intended approval date of March 2015.

I appreciate your consideration and urge you to finalize this SEIS without delay, keeping to the stated deadline for draft comments, and issuing a Record of Decision that enables companies to begin operations in 2015.

Sincerely,

William G. Canon
President
First Avenue Suites LLC
Roundup, Montana

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Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0024
Comment from David Ford, NA

Submitter Information

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General Comment

Please see attached file for list of comments with respect to the Chuckchi Sea Planning Area, Oil and Gas Lease Sale 193 Second Supplemental EIS.

Attachments

Comments on Draft SSEIS Comments_David Ford

COMMENTS ON 2014 DRAFT SSEIS FROM DAVID FORD, NOVEMBER 26, 2014

1. The Draft SSEIS does not sufficiently consider ice gouging with respect to an increase in risks of oil and gas spills from the offshore pipelines. Ice gouging is reported to occur to a depth of 1 to 4 meters but the burial depth of the offshore pipeline is reported to be approximately 3.5 meters. Regardless of this discrepancy, proven methods and sufficient burial depths for protecting offshore pipelines from ice gouging have not yet been established as stated in *Offshore Pipeline Protection Against Seabed Gouging by Ice: An Overview* (Paul Barrette, 2011). Further, as stated in *Alternative Oil Spill Occurrence Estimators and their Variability for the Chukchi Sea – Fault Tree Method* (Bercha Group Inc., 2008, as well as the 2006 and 2014 fault tree modeling studies performed by Bercha Group Inc. as referenced in the Draft SSEIS), the probability of ice gouging used in oil spill risk analyses is based on a mean scour depth of 0.2 meters (0.65 feet) observed in the area of the Northstar pipeline. This scour depth may not be appropriate for the estimate of risk of pipeline rupture due to ice gouging in the Chukchi Sea which reportedly experiences gouging to a depth of 4 meters.
2. The oil spill risk fault tree modeling cited in the Draft SSEIS (Bercha Group Inc., 2014) assumes that upheaval buckling occurs 20% as often as strudel scour. This estimate may not be appropriate as the two events are completely unrelated and strudel scour is only expected to occur to depth of 10 meters, whereas upheaval buckling may occur along the entire length of the pipeline.
3. The oil spill risk fault tree modeling cited in the Draft SSEIS (Bercha Group Inc., 2014) does not consider the risk of tectonic events, which may alter the output for likelihood of a platform spills and/or pipeline spills.
4. The oil spill risk fault tree modeling cited in the Draft SSEIS (Bercha Group Inc., 2014) does not consider the likelihood of current-induced shifting of surface sediment that may undermine pipelines laid on or buried in migrating bedform fields.
5. The oil spill risk fault tree modeling cited in the Draft SSEIS (Bercha Group Inc., 2014) assumes extremely low marine traffic density and thereby reduces the risk of ship collision by 50% from that in non-arctic conditions. This may be an erroneous assumption since marine traffic will likely use leads and polynyas to avoid ice breaking and reduce transit time in newly opened Arctic waters as stated in the FEIS (Section V.C.8.c(4)), which would constrict traffic to narrow channels and thus increase the density of traffic from what might be experienced in open-water conditions. That compounded with other factors including dangerous ice jets, fog, rain, snow, and dark conditions would not justify a reduced risk of ship collisions. In addition, there would be an increase in the risk of collision due to the close proximity of vessels following icebreakers as well as the risk of collisions with floating ice and that would not be experienced in more temperate zones. There is some reasoning that during "open ocean" conditions as first year ice weakens and/or disappears; its ability to keep multi-year ice out of shipping areas will be adversely affected which may result in increased risk of collision. Therefore, the likelihood of ship collisions should not be reduced by 50% but perhaps should be increased from the likelihood in temperate conditions by a more appropriate factor given the above considerations.

6. There is a discrepancy in the data presented in the October 2014 *Updates to Fault Tree Methodology and Technology for Risk Analysis – Chukchi Sea Sale 193 Lease Area* that is cited in the Draft SEIC. *Section 2.5.5 Thaw Settlement* of the 2014 report states that thaw settlement conservatively taken at 50% of the probability of strudel scours, where Table 4.4 states that failure frequency is 10% of that of Strudel Scour.
7. The oil spill risk fault tree modeling cited in the Draft SSEIS (Bercha Group Inc., 2014) does not consider the risks involved in constructing a gas pipeline in proximity to the existing oil transport pipeline. Construction activities in the vicinity of existing pipelines would result in increased likelihood of damage to the existing pipelines and therefore increase risk in a spill originating from a pipeline than might occur under normal circumstances.
8. The oil spill risk assessment presented in Appendix A (Section A.4) of the Draft SSEIS considers an exploration, development, and production of 51 years with an oil production life of 44 years. The duration of 44 years is used for the development of the large oil spill rates for the life of the exploration and production from the leased area. The expected life duration used in the oil spill risk assessment conflict with the 77-year duration presented in the Draft SSEIS Section 4.3.1 Water Quality where exploration would occur during years 1-6, production would occur during years 6-50, and production and decommissioning would occur during years 51-77. In addition, the oil spill risk fault tree modeling cited in the Draft SSEIS (Bercha Group Inc., 2014) used to estimate spill rates considers an exploration and production life of 51 years. The use of a shorter expected project life may result in an underestimate of the spill rates overall. The oil spill risk analyses should correspond with the expected life of the project presented in the main body of the Draft SSEIS.
9. The oil spill risk fault tree modeling cited in the Draft SSEIS (Bercha Group Inc., 2014) does not consider the increase
10. The oil spill risk fault tree modeling cited in the Draft SSEIS (Bercha Group Inc., 2014)
11. In the Draft SSEIS (page 168) the Water Quality Impacts during the Exploration and Development Phase (Years 6-9) are considered moderate. A large oil spill occurring during this phase of development would result in the potential for large quantities of oil to persist in the environment long after a spill event and could be detected in sediment (which presumably would result in degraded bottom water quality) 30 years after a spill (as stated on Page 427 of the Draft SSEIS). This would constitute a "clear, long lasting change in the resource's function in the ecosystem or cultural context." Therefore, it is justifiable that the potential impacts to water quality would be considered "major" in the event of a large oil spill.
12. The Water Quality impacts during the Exploration, Development, and Production Phase (Years 10-25) are discussed starting on page 168, although no determination is made as to the level of impact as was done for the other phases of development, e.g. moderate, major, etc. A large oil spill occurring during this phase of development would result in the potential for large quantities of oil to persist in the environment long after a spill event and could be detected in sediment (which presumably would result in degraded bottom water quality) 30 years after a spill (as stated on Page 427 of the Draft SSEIS). This would constitute a "clear, long lasting change in the resource's function in the ecosystem or cultural context." Therefore, it is

justifiable that the potential impacts to water quality would be considered "major" in the event of a large oil spill.

13. In the Draft SSEIS (page 171) the Water Quality Impacts during the Development and Production Phase (Years 26-50) are considered moderate. A large oil spill occurring during this phase of development would result in the potential for large quantities of oil to persist in the environment long after a spill event and could be detected in sediment (which presumably would result in degraded bottom water quality) 30 years after a spill (as stated on Page 427 of the Draft SSEIS). This would constitute a "clear, long lasting change in the resource's function in the ecosystem or cultural context." Therefore, it is justifiable that the potential impacts to water quality would be considered "major" in the event of a large oil spill.
14. In the Draft SSEIS (page 171) the Water Quality Impacts during the Production and Decommissioning Phase (Years 51-77) are considered moderate. A large oil spill occurring during this phase of development would result in the potential for large quantities of oil to persist in the environment long after a spill event and could be detected in sediment (which presumably would result in degraded bottom water quality) 30 years after a spill (as stated on Page 427 of the Draft SSEIS). This would constitute a "clear, long lasting change in the resource's function in the ecosystem or cultural context." Therefore, it is justifiable that the potential impacts to water quality would be considered "major" in the event of a large oil spill.
15. In the Draft SSEIS (page 171) the Water Quality Impacts associated with all development activities (Years 1-77) are considered moderate due to two large oil spills, various permitted discharges from all activities over all years and the potential effects of introduced aquatic invasive species. Any large oil spill occurring during development would result in the potential for large quantities of oil to persist in the environment long after a spill event and could be detected in sediment (which presumably would result in degraded bottom water quality) 30 years after a spill (as stated on Page 427 of the Draft SSEIS). In addition, the introduction of invasive species could potential result in permanent changes to the existing ecosystem. This would constitute a "clear, long lasting change in the resource's function in the ecosystem or cultural context." Therefore, it is justifiable that the potential impacts to water quality would be considered "major" in the event of a large oil spill.
16. Turbidity is a primary concern during the construction of offshore oil and gas pipelines. As stated in the 2007 FEIS (Section IV. C.1.a(4)(C), dredging would occur at a rate of 2 km/day and the extent of the turbidity plume would be about 6 km at any one time (a 1-km x 3 km area). This phase of construction is expected to occur over a 4-year period (as stated in the Draft SSEIS), presumably occurring throughout the duration of the open water seasons for those years. Previous studies (Welp, Tim, M. Tubman, J. Clausner, T. Fredette, D. Hayes, S. McDowell, and C. Albro. 2001 Coastal and Hydraulic Engineering Technical Note VI-35, March 2001, "Dredge Bucket Comparison Demonstration at Boston Harbor") demonstrated that, during dredging operations using a conventional clamshell bucket, suspended solids concentrations within 26 feet of the dredge averaged 210 mg/L over the water column. However, the studies performed by Welp et al. were typically performed in a low-energy environment. In contrast, Lease 193 is located in a high-energy ocean environment. As such, suspended solids concentrations could be greater within a greater radius than was observed in the cited studies. The USACE Waterways

Experiment Station (WES) predicts that maximum concentrations of suspended solids within 1,640 feet of a clamshell operation would probably be less than 500 mg/L, but could reach up to 900 mg/L at a distance of 100 feet from the dredging site (suspended sediment concentrations may be greater at dredging site) (U.S. Army Corps of Engineers. 1986. Environmental Effects of Dredging Technical Notes. EEDP-09-38 01. December 1986. http://www.wes.army.mil/el/dots/pdfs/eedp09-1.pdf). In general, greater suspended solids concentrations could be expected when debris is encountered that prevents the bucket from closing properly. Because the amount and configuration of debris within pipeline corridors is unknown, this impact would be difficult to control. Turbidity plumes would be expected to persist for the duration of the pipeline construction operations over the expected 4-year period. This would conceivably result in concentrations of various constituents outside a specified mixing zone above the acute (toxic) State standard or USEPA criterion more than once in a 1-year period with averages more than the chronic State Standard or USEPA criterion over 25 square kilometers for a month.

17. **Tectonic Assessment:** Section III.A.1.e(4) of the FEIS states that "only a very few earthquakes have occurred in historic times in the planning area." This statement may be inaccurate as the recent geodynamics of the Chukchi Sea and its individual structures are poorly known due to general insufficient geological and geophysical knowledge of the basin, its seismicity included. The operating coastal seismic stations are reportedly only able to register 7% of all the seismic events occurring in the region (Lithochemical evidence of recent geological activity in the Chukchi Sea, Astakhov et. al., 2014: http://www.researchgate.net/publication/225402334_Lithochemical_evidence_of_recent_geological_activity_in_the_Chukchi_Sea). In addition, the Alaska Division of Emergency Services designates the North Slope Borough as having the hazard of tsunami present, but with the probability being unknown (North Slope Borough Risk Management Division: http://nome.colorado.edu/HARC/members/Scanned_docs/NSBRiskManagement_2005.pdf). The potential for earthquakes and tsunamis should be considered in oil spill risk assessments and for evaluating the relative risks associated with each of the alternatives. As such, the documented earthquake data may not reflect actual earthquake history for the region. Impacts related to potential earthquakes should be assessed for the four alternatives
18. **Traffic:** Neither the FEIS, SEIS, nor the Draft SSEIS assess the impacts associated with the development of Lease 193 on the increasing shipping activities through the Northwest Passage. Such impacts would include issues related to marine traffic circulation and increase risk of collisions resulting in secondary impacts to water quality and biological resources. These impacts should be compared across the alternatives (e.g. proximity of marine traffic schemes in relation to lease areas and Corridor I Deferral Area and Corridor II Deferral Area).
19. **Fracking:** Neither the FEIS nor the Draft SSEIS analyze the impacts associated with potential fracking activities that would occur with the development of offshore leases. Specifically, an analysis of the risks of oil spills, impacts to water quality, and likelihood of inducing earthquakes that may occur as a result of fracking should be performed.
20. **Cumulative Analysis and Methane Hydrates:** The Interagency Roadmap for Methane Hydrate Research and Development: 2015-2030 prepared by the Technical Coordination Team of the National Methane Hydrate R&D Program (available at: http://energy.gov/sites/prod/files/2013/06/f1/Roadmap%202013%20FAC%20Draft%205-28-

13.pdf) states that their goal is to further assess the potential of production of methane hydrates along the Alaska North Slope. The report further states that the development of oil and gas leases in this area will "more readily enable access to the leases, data, personnel, and capabilities that facilitate drilling and evaluation activities in the Arctic," for the purposes of supporting the realization of gas hydrate production. This may constitute a reasonably foreseeable future action, especially when considering the Methane Hydrate Research and Development Act of 2000 as amended in Section 968 of Public Law 109-58, 30 USC 1902 (The Energy Policy Act of 2005) and that the realization of gas hydrate production would likely only occur in the North Slope concurrent with oil and gas production activities.

21. **Draft SSEIS Discrepancies:** The Draft SSEIS states on page 30 that "ninety subsea production wells on fifteen subsea templates are anticipated under the development scenario." This statement conflicts with other data within the Draft SSEIS that 400 to 457 wells would be installed to produce 4.3 Bbbl of oil (e.g. Table 2-4 on page 34 of the Draft SSEIS).

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Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0055
Comment from Nikos Hunner, NA

Submitter Information

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General Comment

Thank you for taking the time to consider my comments. Section 3.1.9 is very informative regarding climate change and evidence of Arctic warming. Several of the trends are very alarming such as permafrost warming, decrease in sea ice, and rising ocean levels. Furthermore, the impacts described to the natural environment from climate change described in section 3.2 are very thorough. Its clear climate change is having a major impact on native cultures, fish, polar bear. I appreciate your including of Figure 3-12 describing the global impacts in recent decades attributed to climate change.

Section 4.3.3 discusses the potential effects of the Action Alternatives on climate change. Aside from saying that GHG emissions would contribute to climate change, this section fails to estimate impacts to climate change from the burning of the produced oil. Your report states that this cannot be done because it would require consideration of large scale or even worldwide GHG emissions, and that current science does not enable you to relate specific sources of GHG emissions to specific climate-related impacts. You have failed to inform the public regarding potentially significant effects of the proposed action. CEQ recommends that the climate change assessment focus on annual and cumulative emissions of the proposed action.

The burning of the produced oil is a connected action that must be analyzed to inform the climate change assessment. Could you please estimate how much carbon would be released from the burning 15.4 Bbbl oil? Could you please estimate how this carbon emission would compare to global emissions. I understand this cannot be exactly quantified, but please give estimates of the relative contribution of the burning 15.4 billion barrels oil to current GHG concentrations.

Based on your analysis in section 3.2 and my personal experiences during the last 10 years, it could be argued that climate change is currently resulting in undue or serious harm or damage to the human, marine, or coastal environment. To what extent would burning 15.4 billion barrels oil exacerbate damage to the human, marine, or coastal environment? If this would greatly increase C02 concentrations, what would be the potential economic cost to the public and the natural environment of an even warmer climate? What indirect impacts would developing 15.4 billion barrels oil have on the development of renewable energy in the United States. If oil development and supply increase, would prices likely decrease slowing the much needed shift to renewable energy?

I would rather not spend my time and money on lawyers to reverse a poorly informed decision, but preventing extreme changes to our climate is worth it. Please consider impacts of production and combustion of oil on climate change.

Regards,
Nikos Hunner

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Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0081
Comment from Conrad Maher, NA

Submitter Information

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General Comment

The data to make realistic estimations of oil and gas that can be produced from the Chukchi Sea Area and Alaska OCS is not
yet available. It will come from further seismic acquisition, careful and competent interpretation of this data followed by perhaps 20 to 30 exploration wells and follow up appraisal wells if any are warranted. No credible reserves estimates are possible until wells have encountered oil/gas and the saturation and physical parameters of the rocks have been determined. In the little data that I have found on the internet, the plays look exceptionally weak as regards, oil source rock, maturation of source rock and possible reservoir rock with parameters that would enable wells to be produced at rates required to overcome the severe production obstacles and maintain a safety margin that the US and the world should demand of any operations approved for this area. There is just too much favorable PR and too little data available for the optimistic estimates and favorable comments for these areas. We need more pragmatic assessments from highly experienced teams with relevant experience in the offshore domain before we can go into these areas, if warranted, with our eyes wide open and fully aware of all the known and unknown risks.

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Document: BOEM-2014-0078-0103
Comment from Brad Fausett, NA

Submitter Information

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General Comment

Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

Re: Comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Mr. Routhier,

For a variety of external reasons, to date, companies have not been able to fully utilize Chukchi Sea leases obtained in a 2008 sale.

I am concerned that over burdensome regulatory restrictions are hindering responsible

development of U.S. Arctic energy resources, stymying national and local economies, negatively impacting jobs and new business development and jeopardizing our national security.

Oil and natural gas have brought prosperity to our nation and revived local economies. Having spent much of my career in energy-related endeavors, I know that energy is intimately linked to our economic and national security. In Arkansas, energy exploration and development have created a climate of entrepreneurship and job growth. Arkansas stands poised to be a major contributor to a national manufacturing renaissance spurred largely by domestic energy cultivation. And developing our countrys energy potential will lessen our dependence on foreign oil, which helps keep us safe.

For these reasons, we need to facilitate not obstruct development of Arctic resources that will allow the U.S. to grow its economy and protect our nation.

Arctic development can be done safely. Companies who own these leases have the resources, technology and expertise to safely explore the Arctics oil and natural gas potential. Companies like mine stand ready to lend emerging technology to complement existing best practices and standards.

I urge the Bureau of Ocean and Energy Management to finalize the Draft Supplemental Environmental Impact Statement and issue a timely Record of Decision so that companies can conduct oil and natural gas exploration and development in 2015.

Sincerely,
Brad Fausett
Owner, Utility Support Services

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Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0107
Comment from Dee B, NA

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Organization: NA

General Comment

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate and would likely lead to an oil spill that would be nearly impossible to clean up. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling.

BOEM-2014-0078-0113

Hampton & Assoc. 8220 2nd Ave Detroit Mi 48202 313-871-2087

11/25/14

Walter D. Cruickshank, PhD
Acting Director, Bureau of Ocean Energy Management
BOEM, Alaska OCS Region
380 I Centerpoint Drive Suite 500
Anchorage, Alaska 99503-5823

Dear Dr. Cruickshank,

After reviewing the Draft Supplemental Impact Statement from BOEM, I would like to express my support and encourage a Record of Decision to be issued as soon as possible so that companies may begin their explorations and work in the Chukchi Sea in the next year.

Our national role in the global energy marketplace is limited by our limited oil and natural gas supply. I believe we are currently at risk of falling behind in the global energy sector, in fact, as other nations have swiftly begun their oil and natural gas development efforts in the Arctic region. But we can remain a contender in global energy leadership by continued exploration and participation in the development of these resources

Our ability to maintain a competitive entity in the global oil and natural gas sphere is a national priority and is one of the reasons I encourage BOEM to move swiftly in issuing a Record of Decision that will allow companies to begin operations in the Arctic region i 2015.

Sincerely,
Willie Hampton
Willie Hampton
Former President Of SEIU Local 79

PUBLIC SUBMISSION

As of: December 18, 2014
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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0127
Comment from Joe Costello, NA

Submitter Information

Name: Joe Costello
Address:
PO Box 3005
Eldorado Springs, CO, 80025
Email: jcostello1@juno.com
Organization: NA

General Comment

I am for complete protection of the Arctic environment from all oil, gas, and mining companies. We should be working that hard to switch to renewables rather than despoiling these irreplaceable ecosystems.

PUBLIC SUBMISSION

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0130
Comment from Denis B Hall, NA

Submitter Information

Name: Denis B Hall
Address:
POB 881
Crested Butte, CO, 81224
Email: denisincb@yahoo.com
Phone: 970-389-6898
Organization: NA

General Comment

Dear Sir or Ma'am:
I am opposed to future drilling in the Arctic Ocean. Specifically, I oppose Lease Sale 193.

My reasons for opposing drilling in general and this Lease Sale in particular include diminution of Arctic wildlife habitat and increased global climate change through continued use of fossil fuels. Furthermore, having worked in the oil and gas exploration industry, I believe oil spills, small and incidental or large and accidental, are inevitable. Should drilling take place, a 75% chance of an oil spill is too high. Technology and spill extraction responses in such a hostile and isolated geography are insufficient and place the fragile and irreplaceable Arctic ecosystem at great and obvious risk. For example, picture polar bears covered with oil as were waterfowl during the BP spill in the Gulf of Mexico. Please deny Lease Sale 193 and future drilling ventures in the Arctic Ocean.

Thank you for this opportunity to comment.

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0132
Comment from B Williams, NA

Submitter Information

Name: B Williams
Address:
901 Sumner Ave
Sumner, WA, 98390
Email: davebethmesh@yahoo.com
Organization: NA

General Comment

Drilling should not be allowed in the Chukchi Sea and in the Arctic as a whole. The environmental damage that will be caused by oil and gas drilling in the arctic are so great, and the chance of an environmental disaster killing large numbers of wildlife so likely, that drilling in this area should be prohibited. The cold will make oil spills impossible to clean up, and the ecosystem there is very fragile, and the animals are already under great stress due to climate change. We should leave fossil fuel in the ground and go to renewable and cleaner energy sources that do not cause human-driven climate change.

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Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0133
Comment from Mary Zalar, NA

Submitter Information

Name: Mary Zalar
Address:
PO Box 81743
Fairbanks, AK, 99708
Email: zalar49@gmail.com
Organization: NA

General Comment

I do NOT support Lease Sale 193 and would like the final EIS to not allow drilling offshore in Arctic waters. I can't imagine a more difficult environment to try to mitigate an oil spill that is very likely to happen (75% chance is totally unacceptable). The technology, infrastructure, response ability simply does not exist. The United States should be putting its political will, capital, and "energy" toward the transition to non-fossil fuels. Drilling in a fragile, remote, harsh environment like the Arctic Ocean is short-sighted and irresponsible.

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0134
Comment from Dana Durham, NA

Submitter Information

Name: Dana Durham
Address:
P. O. Box 1016
Girdwood, AK, 99587
Email: dizzydunkin@hotmail.com
Organization: NA

General Comment

I do NOT support Lease Sale 193.
I do NOT want to see any further drilling in the Arctic Ocean.
I WANT to keep the Alaska's ocean free of oil spills.
There is a 75% chance of an oil spill and this high risk is TOO great a cost.
The technology and spill extraction responses are completely insufficient to risk the Arctic ecosystem.

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0135
Comment from Jean Robbins, NA

Submitter Information

Name: Jean Robbins
Address:
3005 NE 181 ST
Lake Forest Park, WA, 98155
Email: Oberland@aol.com
Organization: NA

General Comment

The risks of devastation in this fragile pure landscape, home for migratory birds, caribou and polar bears is just not worth it. Why not put all your resources into alternative energy solutions. Are the developers not smart enough to do this? Instead, make jobs for new cars and appliance makers in the lower forty eight.HELP END THE MADNESS OF OUT INVOLVEMENT IN THE MIDDLE EAST AND THIS TERRIBLE FRAKING.
BE A HERO NOT A DEVASTATOR. I will sing your praises forever if you make this shift and I will buy your new products. This is best for the arctic environs and for our grand children.

Southgate Resources, LLC

December 18, 2014

Michael Routhier
Program Analysis Officer and Project Manager
Bureau of Ocean Energy Management, Alaska OCS Region
3801 Centerpoint Drive Ste. 500
Anchorage AK 99503-5820

Re: Draft Supplemental Impact Statement for Lease Sale 193

Dear Mr. Routhier:

On behalf of Southgate Resources, LLC, I would like to express my strong support for oil and gas development in the Chukchi Sea and to urge the Bureau of Ocean Energy Management (BOEM) to finalize expeditiously the Supplemental Environmental Impact Statement for Lease Sale 193, reaffirm Lease Sale 193 and allow exploration activities to proceed.

Lease Sale 193 has undergone exhaustive environmental review, and BOEM once again has acknowledged that exploration can be done with minimal environmental impact. Oil and gas development in the Chukchi Sea can and should be done safely, and it is past time for the government to affirm Lease Sale 193 and allow exploration to proceed so that Americans can fully realize the energy and economic benefits increased domestic energy production can bring.

Offshore oil and gas development in Alaska will strengthen our energy security, create jobs in Alaska and across the country and generate significant government revenue. With a conservatively estimated 27 billion barrels of oil and 132 trillion cubic feet of natural gas, energy production on Alaska's OCS is critical to our country's long-term energy supply. It is estimated that economic activity from the development of the Chukchi and Beaufort Seas would create an annual average of 54,700 jobs nationwide. Government revenue generated from the Chukchi Sea is estimated to be nearly $50 billion over the next fifty years. The benefits of energy production on Alaska's OCS cannot be overstated; development of our domestic energy resources is an asset to the entire economy.

In order to achieve greater price stability for consumers, America needs more energy – not less. Taking steps now to ensure that we have access to energy resources in the long term will ensure Americans will benefit from the security of a stable supply of American fuel for decades. For that reason, Southgate Resources strongly supports affirmation of Lease Sale 193.

Upon conclusion of this public comment period, I respectfully request that BOEM quickly finalize the SEIS and allow leaseholders to move forward with planned exploration and production. I appreciate BOEM's attention to this important matter and look forward to safe and responsible energy production in the Chukchi Sea.

Sincerely,

Jack Belcher
President, Southgate Resources, LLC
2213 Devonshire
Houston, TX 77019

STEVE PRATT ENTERPRISES

P.O. Box 112781
Anchorage, Alaska 99511
steve.pratt@acsalaska.net

December 18, 2014

Michael Routhier
Program Analysis Officer and Project Manager
Bureau of Ocean Energy Management, Alaska OCS Region
3801 Centerpoint Drive Ste. 500
Anchorage AK 99503-5820

Re: Draft Supplemental Impact Statement for Lease Sale 193

Dear Mr. Routhier:

I would like to express my strong support for oil and gas development in the Chukchi Sea and urge the Bureau of Ocean Energy Management (BOEM) to expeditiously finalize the Supplemental Environmental Impact Statement for Lease Sale 193, reaffirm Lease Sale 193, and allow exploration activities to proceed. As an Alaska small business owner, I can assure you that this lease sale, and other resource development activity, is crucial for the economic vitality of my family, friends, and neighbors.

Lease Sale 193 has undergone exhaustive environmental review, and BOEM once again has acknowledged that exploration can be done with minimal environmental impact. Oil and gas development in the Chukchi Sea can and should be done safely, and it is past time for the government to affirm Lease Sale 193 and allow exploration to proceed so that Americans can fully realize the energy and economic benefits increased domestic energy production can bring.

Offshore oil and gas development in Alaska will strengthen our energy security, create jobs in Alaska and across the country and generate significant private sector and government revenue. Energy production on Alaska's OCS is critical to our country's long-term energy supply. It is estimated that economic activity from the development of the Chukchi and Beaufort Seas would create an annual average of 54,700 jobs nationwide. Government revenue generated from the Chukchi Sea is estimated to be nearly $50 billion over the next fifty years. The benefits of energy production on Alaska's OCS cannot be overstated; development of our domestic energy resources is an asset to the entire economy.

In order to achieve greater price stability for consumers, America needs more energy – not less. Taking steps now to ensure that we have access to energy resources in the long term will ensure Americans will benefit from the security of a stable supply of American fuel for decades. For that reason, I strongly support affirmation of Lease Sale 193.

Please finalize the SEIS and allow leaseholders to move forward with planned exploration and production in the near term. I appreciate BOEM's attention to this matter and look forward to safe and responsible energy production in the Chukchi Sea.

Sincerely,

Steve Pratt

BOEM-2014-0078-0145

December 18, 2014

Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

Re: Comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for the Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Dear Mr. Routhier,

I support the Bureau of Ocean and Energy Management (BOEM) Draft Supplemental Environmental Impact Statement (SEIS) and ask that BOEM expeditiously issue a Record of Decision (ROD) so that companies can conduct oil and natural gas exploration and development in the Chukchi Sea in 2015.

We can strengthen U.S. competitiveness by producing more American oil and natural gas and creating more American jobs across the nation. A diverse array of businesses are already benefiting from oil and natural gas development in Montana, and even greater development will only serve to further that growth.

The benefits show up in the state's salary statistics as well. Thus, while the average annual salary in Montana across all industries and sectors is $36,499, the average oil and gas industry salary (excluding gas stations) is very substantially higher—$81,226 annually. Overall the industry supports $4.5 billion of the Montana economy. That's 10.8 percent of the state's total economic activity.

I appreciate your consideration and urge you to finalize this SEIS without delay, keeping to the stated deadline for draft comments, and issuing a Record of Decision that enables companies to begin operations in 2015.

Sincerely,

Bruce MacIntyre

Director, Business Advocacy & Government Affairs; Billings Chamber

BOEM-2014-0078-0149

Vets4Energy
Veterans Working to Ensure National Security through Energy Security

December 5, 2014

Michael Routhier
Program Analysis Officer and Project Manager
BOEM, Alaska OCS Region
3801 Centerpoint Drive, Ste. 500
Anchorage, AL 99503-5823

Re: Comments on Draft Second Supplemental Environmental Impact Statement (SEIS) for Chukchi Sea Planning Area, Oil and Gas Lease

Dear Mr. Routhier:

As a veteran who proudly served our great country, I am very interested in our economic and national security. Becoming more oil and gas independent decreases our reliance on unstable countries and fuels jobs and our manufacturing renaissance, all while lessening our need to depend on those who seek to do us harm.

We must facilitate—not impede—the development of those resources that allow us to strengthen our economy and protect our nation. I support your SEIS to develop the Chukchi and Beaufort Seas Alaskan off-shore region. Please do not delay your ROD by extending the comment period or otherwise delaying the process. Thank you for your consideration.

Sincerely,

Robert J. Hayes, BG, US Army, Ret.
4065 Ramrod Circle
Reno, NV 89519

PUBLIC SUBMISSION

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Docket: BOEM-2014-0078
Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement; Chukchi Sea Planning Area, Outer Continental Shelf, Alaska OCS Region

Comment On: BOEM-2014-0078-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0150
Comment from Puneet Ahluwalia, NA

Submitter Information

Name: Puneet Ahluwalia
Address:
1055 Rector Lane
Mclean, VA, 22102
Email: puneet109@gmail.com
Phone: 7032836644
Organization: NA

General Comment

Where their is Oil, people & businesses will eventually come and drill it. It is time for our nation to take the responsible lead on drilling in Arctic Ocean. If we do not, other nations will not abide by the same rules and standards. We will be following their lead.

Besides creating numerous jobs in US and drilling will lead to innovative ways to support and protect the Arctic life and natives. The revenues created will fund further research on many fronts. Protecting our national assets is of vital importance to all Americans. We are a country of law and transparency and greatly care about our wildlife and natural resources.

The oil drilling will have multiple impact leading to trickle down effect of energy independence. It will lead to a major jump in our economy, creating jobs with prosperity among Americans. We will see growth in our manufacturing and other areas of development in various sectors.

US is a beacon of hope and stabilizing force in the present world. It will defer nations who are not in sink with our democratic values and role as leader of the free world. There are countries who do

not play by the same rules and are threatened by our principles. Theses countries will take every step overtly and covertly to take our individualism and American way of life from us.

It is important that we do not give our billions of dollars of oil revenues directly and in-directly to nations who do not condone acts of terrorism against American and democratic nations.

The Oil drilling will be another positive message to our allies and strategic partner nations who are dependent on other oil producing nations. We will be the reliable resource and source of energy for these nations, further strengthening our role in global economy.

I understand the concerns and pushback on drilling in Arctic Ocean but as a nation we need to move forward with decisive action and retake our leadership position. There are numerous reasons stated are the very reasons to start drilling now, rather than drilling during precarious and desperate times. We do not want to initiate action when were are under duress or siege.

I say we "Drill and Drill Now"

Comments on Chukchi Sea Oil and Gas Lease Sale 193
12/19/2014

1. I request an extension of the public comment period on this issue of global importance. Forty-five days is simply inadequate to review a 694-page technical document, plus appendices and associated reference materials, particularly during a major multi-cultural holiday period. An additional 45 days should be allowed for the public to review these documents more thoroughly to understand their importance and the complex interrelationships in the natural environment of the Arctic waters off Alaska. As a retired environmental consultant who has helped prepare many EIS documents, I feel my review, to-date, is woefully inadequate to prepare all the comments I feel are necessary on this important topic. I note that the absence of an Executive Summary and the repeated reference to prior EIS documents significantly slowed my review.

2. It appears to me that this second SDEIS was hastily prepared, as well as the comment period shortened, perhaps, in order to allow Shell Oil to proceed with their proposed 2015 drilling plan in the Chukchi Sea. I found no evidence on the record that the courts that mandated this supplement also mandated an expedited process and review period. Yet, if Shell or others are to proceed at any time with exploratory drilling, this NEPA process must be complete and robust. Expediting the NEPA process to accommodate industry puts the cart before the horse. The public needs more time to comment.

3. According to the description of the existing environment, climate change (global warming) is adversely affecting the Arctic region more than any other place on the planet. Even without energy exploration and development, the threatened polar bear population seems doomed due to the rapidly melting sea ice and the subsequent demise of their natural food sources. Populations are predicted to decline between 60%-80% over the life of this lease sale program if it proceeds, yet without any energy development (No Action Alternative). No matter what the potential impacts of energy development in the lease sale area on this iconic species, it would follow that with such dire survival rates without it, any energy development would surely drive this species to extinction. Is our addiction to hydrocarbons so vital to our species that we must drive other species to extinction when we have numerous, better and more sustainable energy alternatives that could preserve polar bears and many other heavily impacted species? Indeed, climate scientists tell us with no uncertainty that the survival of our own species depends not on fossil energy, but on the absence of it. Since there is no way to avert or substantially mitigate energy development impacts on many Arctic species, it would seem the right thing to do for the planet would be to select the No Action Alternative and focus our efforts on better energy alternatives.

4. It seems highly ironic that the sole purpose of this lease sale program is to produce the very product (hydrocarbon energy) that Man is using, without restraint, to destroy the planet, potentially rendering it uninhabitable for even our own species. It is even more ironic that this program seeks hydrocarbon energy in the very place that is most impacted by the resultant carbon emissions it would produce. If the oil companies were thinking beyond the next quarterly statement to all future generations, they would be moving "beyond petroleum," a catchy phrase that ultimately meant nothing to BP Energy.

5. The current faltering price of oil is about half that needed to make any energy development in the Arctic waters economically feasible. And, if the program were approved and development were to proceed, the hydrocarbons it might produce may not even be needed in an ever-changing world. Why risk destroying our Arctic environment for fossil fuels that may never be needed, or cost-effective even if carbon energy remains a primary source of energy globally. If carbon taxes are instituted to compensate for the full cost of carbon-based energy, which we have never paid and a likely event in the not too near future, then the economics of this program become even more tenuous. Even if global oil prices return long-term to values needed to support this program, such prices would provide even more incentive to seek more sustainable alternative energy sources. All economic arguments lead to the ultimate failure of these leases ever producing any energy in an economically viable manner.

6. Over the 74-year life of this proposed program, the global energy mix might change substantially. Indeed, if it doesn't, we may well doom ourselves in terms of survivability of the planet and that of our own species. Human habitat may well be more engaged in true survival and adaptation over that timeframe. While 4.3 billion barrels of oil potentially produced under lease sale 193 may not seem a large contributor to that ultimate dilemma, it is symbolically and inherently at fault. This program is entirely the wrong direction for the planet. We know we have to stop using carbon energy and that ultimately means we have to stop producing it. Given the extreme potential risks to the natural Arctic environment of this extreme program and its tenuous economics in the face of a changing energy balance, this would be a good project to halt in the interest of the future of our planet. If we lead, others might follow. If we don't lead, the planet may be doomed.

7. With the successes of hydraulic fracturing in the lower 48 states and elsewhere producing the current glut of oil on the world markets, and the projected reserves it has produced, it seems unwise and economic fantasy to pursue oil development in the extreme Arctic environment with all its unknowns and difficulties that increase environmental risk and shaky economics. The SDEIS says that the most likely outcome of approval of the program is drilling a bunch of dry holes and an insufficient amount of hydrocarbons being found to be economically viable. In light of the numerous cheaper alternatives to this oil, I suggest it is folly to pursue even exploration.

8. The greatest risk of very large oil spill (VLOS) occurs during the drilling of exploratory wells when little of the necessary infrastructure for safety and response are in-place. Many of the assets necessary for a robust response to a VLOS are located nowhere near the lease area (days if not weeks away). And unlike in the Gulf of Mexico where drilling is common and vast amounts of response assets are available, options for other platforms to drill relief wells are a month or more away, if contracts for their alternate use are already in-place prior to a VLOS event. It seems the risk for the greatest damage to the environment is, by design, at the time when the ability to respond is minimal. I strongly suggest that the only way such a program could be approvable is if the assets necessary for a full-scale and immediate VLOS response are in-place and up to speed and fully ready to respond. While that may be costly, it is just another cost of doing business the right way. Oil companies have always been cheap and wasteful, but the Arctic, and especially America's Arctic, is not the place for such risky business practices.

9. The U.S. is not the only country investigating oil and gas development in Arctic waters, although ours may be the most robust and objective process to do so. Given the harsh environment of the Arctic waters and the risky nature of the oil and gas industry, especially offshore, along with the critical habitats for several endangered and threatened species such as the polar bear, the ultimate answer should be that the Arctic waters should be off-limits to all carbon energy development. Perhaps only the U.S. is mature enough through the NEPA process to see the wisdom of not developing such hydrocarbon energy, if any exists. By not developing our Arctic hydrocarbon assets, we might well become the global sanctuary for all those threatened and endangered species so heavily dependent upon Arctic waters. This alternate vision for the proper "use" of America's Arctic waters is ecotourism, not energy development. Indeed, we might be the only country that does not develop its Arctic energy reserves – that's leadership.

10. It was President Theodore Roosevelt who proffered the concept of the greatest good for the greatest number. That principle must apply here in considering development of hydrocarbon energy, who's days are numbered, in the Arctic, America's last wilderness. But, who are the greatest number? As Roosevelt said, it is the unborn future generations, and those generations will not rely so heavily, if at all, on fossil energy – indeed, must not if we are to survive. If the greatest number is determined to be the current generations of fossil energy users, the extinction of Mankind is suggested. Therefore, if we are to adequately consider future generations as the target of our greater good, then hydrocarbon energy development in such harsh and risky environs has little future value, as does this program. The No Action alternative is the most valuable alternative to achieve the greatest good to the greatest number.

Respectfully submitted,
Gregory L. Scott
Evergreen, CO 80439

BOEM-2014-0078-0173

Sunday, December 21, 2014

Subject: Please Protect Arctic Wildlife and our Climate by Rejecting Oil and Gas Lease Sale 193 -- Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 (Docket ID BOEM-2014-0078-0001)

Dear Bureau of Ocean Energy Management Acting Director Walter Cruickshank,

I strongly urge you to protect the wildlife and people of the Chukchi Sea from risky, reckless oil drilling, and to take a step away from dirty fossil fuels, by deciding to reject oil and gas lease sale 193. Given Shell's disastrous 2012 season that showed the company incapable of operating safely in the Arctic Ocean, including a grounding and near-grounding of its drilling equipment, the Bureau of Ocean Energy Management (BOEM) should select Alternative II, which would vacate the Chukchi Sea lease sale.

"Our duty to the whole, including to the unborn generations, bids us to restrain an unprincipled present-day minority from wasting the heritage of these unborn generations. The movement for the conservation of wildlife and the larger movement for the conservation of all our natural resources are essentially democratic in spirit, purpose and method."
-- Theodore Roosevelt

The Chukchi Sea was put at risk by the horrific decision made by the Bush administration in 2008 to offer oil companies tens of millions of acres in Lease Sale 193. That decision was illegal in 2008, and so was the Bureau of Ocean Energy Management's decision to recommit to it in 2010. Last January, the Ninth Circuit Appeals Court declared the lease sale unlawful, requiring the BOEM to redo the analysis of environmental effects of drilling in the sea and reconsider whether the region should be open to drilling at all. This is the second time the massive offshore oil and gas sale—which was rushed through based on poor science and arbitrary assumptions—has been sent back by the courts.

"It is horrifying that we have to fight our own government to save the environment."
-- Ansel Adams

You now have the opportunity and obligation to chart a new course for the Chukchi Sea based on science and precaution. Please do not make the mistake of opening the Chukchi Sea to oil drilling a third time. To fully protect the people, the birds, the marine mammals, and other wildlife that rely on the Chukchi Sea, the Supplemental Environmental Impact Statement (SEIS) must take into account the best and most current science available, without rushing toward new drilling.

"Then I say the Earth belongs to each generation during its course, fully and in its own right, no generation can contract debts greater than may be paid during the course of its own existence."
-- Thomas Jefferson

The Chukchi Sea is a unique and valuable ecosystem that will be put at serious risk from oil and gas drilling. It is home to iconic and irreplaceable wildlife, including polar bears, walruses, bowhead whales, ice seals, and dozens of bird species, and to a thriving indigenous culture. In particular, areas such as the Chukchi Corridor, Barrow Canyon Complex, and Hanna and Herald Shoals, are critical to the health of this ecosystem, and will provide resilience in the face of climate change. The Chukchi Sea and its inhabitants are already under tremendous stress from climate change. Just this last fall, some 35,000 walruses were forced ashore in a crowded coastal haul-out because of dramatic sea ice melt, placing them far from food sources and exposing mothers and calves to the risk of trampling from stampedes.

"These temple destroyers, devotees of ravaging commercialism, seem to have a perfect contempt for nature, and, instead of lifting their eyes to the God of the Mountains, lift them to the almighty dollar."
-- John Muir

Shell tried to drill in the Chukchi Sea in 2012. Its drill ship ran aground and caught fire. If that wasn't bad enough, the critical oil spill containment dome Shell proposed using was crushed like a "beer can" during testing in more placid waters. The Environmental Protection Agency (EPA) found that Shell's equipment was inadequate to control pollution. As Shell's failed efforts to drill exploration wells in 2012 reminded us, the Arctic is remote, dangerous, and unforgiving. There is no proven technology capable of responding to a spill in icy Arctic conditions, and companies simply are not ready to operate in the Arctic Ocean. Even with its history of mishaps, Shell made it clear that it intends to drill in its leases in 2015 when it filed its exploration plan with the BOEM in August 2014. That Shell and other oil companies have spent billions of dollars to purchase leases and pursue exploration is not sufficient reason to continue to seek to justify the bad decision to sell Lease 193 and other leases in the Arctic in the first place. There's no reason to believe Shell can be trusted to drill safely in the Arctic Ocean.

"Our government is like a rich and foolish spendthrift who has inherited a magnificent estate in perfect order, and then has left his fields and meadows, forests and parks to be sold and plundered and wasted."
-- John Muir

Drilling and other industrial oil and gas activities in the Chukchi Sea put Arctic people and wildlife at risk from noise and disturbance, air and water pollution, and oil spills. Polar bears drowning in oil. Whales inhaling toxic oil fumes. Threatened eiders potentially decimated, and distinct populations of salmon obliterated. These are just some of the impacts the BOEM predicts would be the result of a large oil spill in the draft SEIS for Lease Sale 193. The sensitive federal, state, tribal, and private lands along the coast also would be greatly harmed if they were oiled. Birds such as the Spectacled, Steller's, and King Eiders, Brant, Thick-billed Murres, and Yellow-billed Loons, along with mammals such as polar bears, Pacific walrus, bearded and ringed seals, beluga and bowhead whales, and many more, must be protected from the real risk of oil spills.

"If future generations are to remember us with gratitude rather than contempt, we must leave them with more than the miracles of technology. We must leave them with a glimpse of the world as it was in the beginning, not just after we got through with it."
-- Lyndon B. Johnson

And, based on Shell Oil's disastrous track record and according to the government's own report, it's not *if* an oil spill will happen, but *when*. The draft SEIS demonstrates clearly that the effects of leasing in the Chukchi Sea could be catastrophic. For example, in the SEIS, the Department of the Interior acknowledges that there is a 75 percent chance that one or more large oil spills would occur if the leases are developed.

"To waste, to destroy, our natural resources, to skin and exhaust the land instead of using it so as to increase its usefulness, will result in undermining in the days of our children the very prosperity which we ought by right to hand down to them amplified..."
-- Theodore Roosevelt

There is no way to effectively clean up or contain an oil spill in Arctic Ocean conditions. In April 2014, the National Academy of Science's National Research Council made it clear that we don't know enough about oil in US Arctic conditions to clean it up. There isn't enough infrastructure on Alaska's North Slope to even respond with conventional clean up technology. Your own document shows that measures used to "clean" a spill, like chemical dispersants and burning the oil, would add threats to marine animals.

"As we peer into society's future, we—you and I, and our government—must avoid the impulse to live only for today, plundering for our own ease and convenience the precious resources of tomorrow. We cannot mortgage the material assets of our grandchildren without risking the loss also of their political and spiritual heritage. We want democracy to survive for all generations to come, not to become the insolvent phantom of tomorrow."
-- Dwight D. Eisenhower

In the face of these risks and the myriad other serious adverse effects the document acknowledges would accompany oil development even in the absence of an oil spill, the choice is clear—drilling for oil in the US Arctic poses too large a threat to be allowed and you must not affirm the lease sale. If we want to protect our iconic wildlife and our sensitive ecosystems, we should not to drill in America's Arctic.

"I think America will have come to maturity when it will be possible to erect somewhere in the United States a great bronze marker which will read:
"'Beneath these lands which surround you there lies enormous mineral wealth. However, it is the judgment of the American people, who locked up this area, that these lands shall not be disturbed, because we wish posterity to know that somewhere in our country, in gratitude to nature, there was at least one material resource that we could let alone.'"
-- Freeman Tilden

Exploring for and developing oil in the Chukchi Sea also puts the climate at risk. As President Obama has recognized, much of the world's fossil fuels will have to remain in the ground, undeveloped, if we are to have even a chance of reaching our climate goals. Drilling in the rapidly melting Arctic Ocean for more oil that will only further heat the planet adds climate insult to climate injury. Yet the draft SEIS does not even consider the climate impacts of burning the oil produced as a result of the sale. Saying the contribution to climate change would be "negligible" is disingenuous. This fall, over 400,000 people marched in New York City to call for urgent action on our climate. You cannot ignore the impact that the burning of 4.3 billion barrels of oil will have on the global climate and the rapidly melting Arctic from which it will be extracted. The lease sale decision is a golden opportunity for the Obama administration to show climate leadership by deciding to leave dirty Arctic oil in the ground by keeping the Chukchi Sea off limits to drilling. If we are serious about addressing climate change, safeguarding America's Arctic Ocean from oil and gas drilling would be a tremendous step forward.

"It is our task in our time and in our generation, to hand down undiminished to those who come after us, as was handed down to us by those who went before, the natural wealth and beauty which is ours."
-- John F. Kennedy

The 2008 decision to hold Lease Sale 193 was made despite widely acknowledged gaps in scientific information, the complete lack of proven response technologies for the harsh and unforgiving Arctic Ocean conditions, and substantial problems in the outreach and decision-making process in the Alaska region of the Minerals Management Service. Some progress has been made, but neither the government nor companies are ready for oil drilling in the Arctic Ocean.

"We abuse the land because we regard it as a commodity that belongs to us. When we see the land as a community to which we belong, we may begin to use it with love and respect."
-- Aldo Leopold

The administration cannot continue to push an outdated and dangerous "all of the above" energy strategy, encouraging trans-national oil companies to take ever increasing risks to capture the last of the oil, hastening dangerous global climate change, and putting the Arctic and the iconic wildlife that call it home in peril. Please take into account the most current science available to protect wildlife, in order to ensure that this incomparable ecosystem remains pristine for future generations.

"Every man who appreciates the majesty and beauty of the wilderness and of wild life, should strike hands with the farsighted men who wish to preserve our material resources, in the effort to keep our forests and our game beasts, game-birds, and game-fish—indeed, all the living creatures of prairie and woodland and seashore—from wanton destruction. Above all, we should realize that the effort toward this end is essentially a democratic movement."
-- Theodore Roosevelt

It is clear that this lease sale is too dangerous to allow. The Chukchi Sea is too important to risk for questionable, short-term gain. I strongly urge President Obama, Secretary Jewell, BOEM Director Cruickshank to take a big step toward a clean energy future by invalidating the Chukchi Sea lease sale 193 and making the Arctic off limits to oil exploration and development in perpetuity, as President Obama recently did for Bristol Bay.

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."
-- Aldo Leopold

Thank you for your consideration of my comments. Please do NOT add my name to your mailing list. I will learn about future developments on this issue from other sources.

Sincerely,
Christopher Lish
Olema, CA

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Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Alaska OCS Region, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193

Document: BOEM-2014-0078-0176
Comment from Douglas McIntosh, NA

Submitter Information

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General Comment

To whom it may concern:
The risk of an oil spill in the Chukchi Sea is not worth taking. I oppose any and all drilling there.
Sincerely,
Douglas McIntosh

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Document: BOEM-2014-0078-0185
Comment from Ron Rafson, NA

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General Comment

I oppose further oil company development in the arctic ocean.

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Document: BOEM-2014-0078-0188
Comment from John Strasenburgh, NA

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General Comment

December 19, 2014

BOEM Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, AK 99503-5823

Re: Docket ID: BOEM-2014-0078

To whom it may concern:

These are my public comments on the Draft Oil and Gas Lease Sale 193 Second Supplemental Environmental Impact Statement (SEIS), Chukchi Sea Planning Area.

I have lived in Alaska for over 40 years, and traveled much of the north slope, to points between Demarcation Bay on the east to Point Lay on the west. I greatly appreciate and value highly the majesty and biological abundance of the intact ecosystems of the far Arctic north. I also have

great respect for the subsistence and cultural values of the native peoples.

I am opposed to this oil and gas lease sale.

I am concerned about potential oil spills and the disastrous effect that will have on the Arctic waters and all that it supports; from the walrus, seals, whales and polar bears at the top, to the tiny organisms at the bottom. I am concerned about the effect of a spill on birds. I am concerned about the potentially catastrophic effect that a spill will have on subsistence and native cultures.

And, aside from oil spills, I am concerned about the disruption that normal exploratory or production operations would have on marine life and bird populations.

Industry lacks the capability to respond to an oil spill much less contain it and clean it up.

There is virtually no infrastructure, the dynamics of how an oil spill would behave or spread under the variety of Arctic ice conditions are virtually unknown, little is known also about how to contain or clean up a spill amidst sea ice, and the technology to effectively carry out a cleanup in Arctic Ocean conditions has not yet been developed.

Furthermore, to my knowledge, the biologically or environmentally sensitive areas at sea and on the shore have not been identified and mapped, which is information essential to effective clean up in the event of a spill.

And, of course, lacking all of the above, development of a training program for effective oil spill response is impossible, and therefore training necessary for effective clean up has not occurred.

The question is not if an oil spill will occur; it is when.

I am tired of broken promises, followed by industrys cries of its unprecedented, its unprecedented, its unprecedented as if this somehow justifies industry incompetence, oversights, or omissions.

Its like Lucy, Charlie Brown, and the football. How many times do we, the public, our communities, our local economies, the wildlife, and the environment have to take yet another run at Lucys football and pay the price of some unprecedented event.
And, on top of that, the industry cannot be trusted to act competently and in good faith. Take for example, Shells contractor, Noble Drilling, for its 2012 Chukchi Sea operation. This is an international drilling company, one of the largest in the world, which, in 2013 reported $783 million in net income on $4.2 billion in revenues. It had ample resources to do it right.
Noble is one of the largest and most sophisticated drilling operators in the world, and yet it failed to abide by these well-understood and basic legal requirements. (see Alaska Dispatch, sentencing memorandum filed Monday 12/15/14 in U.S. District Court
http://www.adn.com/article/20141218/shell-contractor-noble-drilling-be-sentenced-felony-violations)

This is but one example. BPs Horizon in the Gulf of Mexico, the Exxon Valdez and may other spills large and small are other examples. The conclusion is irrefutable: industry cannot be expected to be consistently careful and conscientious, competent, and to act in good faith.

The Arctic Ocean, including the Chukchi Sea and the Beaufort Sea, is critically important in biological, habitat, subsistence, and cultural values. It is remote, the weather is unpredictable and severe, lacking in infrastructure, technology isnt up to the task, and conditions are such that

industry and government agencies are not equipped or trained to handle.

It is much too valuable a resource to risk under these uncertain and unpredictable circumstances.

Please cancel Lease Sale 193.

Sincerely,

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Document: BOEM-2014-0078-0190
Comment from Alberto Saavedra, Earth Accounting

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General Comment

Allowing Shell to drill the Arctic Ocean decimates the credibility the U.S. will have when in April 2015 the U.S. has a rare chance to showcase its international credibility as an Arctic leader in assumption of its two-year responsibility to chair the Arctic Council (a high-level intergovernmental forum that addresses primarily environmental protection and sustainable development issues in the Arctic region), a situation that will not recur until 2031.

And we need to phase out fossil fuels ASAP.

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Document: BOEM-2014-0078-0191
Comment from Ernest Rosado, Mr.

Submitter Information

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General Comment

Allowing Shell to drill for oil in the Arctic Ocean would be disastrous for the climate, the improvement of Arctic peoples' livelihoods and will certainly lead to oil spills that are increasingly impossible to clean up as surrounding waters warm due to climate change in which the Arctic is heating faster than any other equivalent sized region by which I mean both the biosphere region and the geopolitical region. I urge you to reject Lease Sale 193 and make the Arctic off limits to oil drilling. The Dec.10, 2014 installment of NOAA's Arctic Report Card shows Arctic air temperatures are rising at more than twice as fast as the planet. The U.S. must not undermine international cooperation in the Arctic region amidst these uncertain geopolitical times by granting the Arctic access that Shell seeks for a cheap $2.1 billion to the U.S. government in 2008 to lease the area on an original estimates of just 1 billion barrels of oil. Bureau of Ocean Energy Management now estimates Shell could produce as much as 4.3 billion barrels. Interior acknowledges that there is a 75 % chance that one or more large oil spills (more than 1,000 barrels or 42,000 gallons of oil) would occur if the leases are developed. There is no way to effectively clean or contain oil spillage in Arctic Ocean conditions. U.S. Coast Guard investigation released in April 2014 found Royal Dutch Shell and Edison Chouest severely underestimated risk of towing an unpropelled oil rig through wintry storm Gulf of Alaska in December 2012 when Shell

let Kulluck run aground. Adm. Servidio said, â€œIn this case, risks associated with a single-vessel tow by a purpose-built vessel of a unique conical-shaped hull, with people aboard, in winter waters where weather systems and seas are expected to rapidly develop, were extremely high.â€ Letting Shell drill Arctic seas decimates credibility U.S. must have in its April 2015 rare chance to show international credibility as an Arctic leader, chairing the Arctic Council, a situation that will not recur until 2031. U.S. has only this brief window of opportunity to shape international policies to advance U.S. national interests tied to far northern resources with sensible territorial management, and improve the livelihoods of Arctic peoples, including many indigenous nations with whom the U.S. holds Constitutional and Arctic Council mandates to honor native sovereignty (nation-to-nation relations). Despite the mid-2014 appointment of Admiral Papp as special representative for the Arctic and recently released national road-maps and strategies, the Arctic remains a policy and investment afterthought. Investments the U.S. must make should not be driven by Shell profit motive but instead by publicizing reality that the Arctic has been warming since the 1960's; accelerated significantly in the past 30 years. Arctic change from ice-covered to seasonally ice-free by the 2030's, accelerating the peril of extinction events for species, including humans, too many and yet unidentified to enumerate will happen. The U.S. promised to keep broad priorities including improved economic conditions for Arctic inhabitants, safe shipping, sustainable resource development, protecting and adapting the Arctic environment at a time of rapid climate change. Allowing Shell to drill will put the lie to another broad goal of U.S. chairmanship of the Arctic Council: to develop a robust public outreach program and to educate United Statesans as well as citizens of other nations on the importance of the Arctic and its potential global impacts. Shell must not be allowed to risk wreaking environmental and international havoc (by which I mean wide, general destruction with devastation, great confusion and disorder) as both Arctic tourism and business are increasing, Alaskan and Native Nations ports, airports and cities are becoming more important conduits for global commerce. Private, domestic and multinational companies seeking to realize these opportunities are becoming driving engines of local economies and scientific communities, as well as a potential sources of tax and other revenue for state and federal bureaus. With similar investment opportunities opening in non-U.S. Arctic areas, the decision on whether these companies choose to invest in the United States will be based in part on the comparative infrastructure and regulatory climate of U.S. and Native Nations' jurisdictions. Instead of prompting reckless Arctic drill, U.S. should promote the implementing Arctic Councilâ€™s 2011 Search & Rescue and 2013 Oil Spill Preparedness & Response agreements through concrete protocols. U.S. should embrace more meaningful oil spill prevention commitments like higher liability caps. The U.S. chairmanship must promote the importance of the Polar Code, particularly Part 2 on pollution prevention and encourage the resolution of maritime boundary issues, including U.S. ratification of UNCLOS (United Nations Convention on the Law of the Sea).

Michael Routhier,
Program Analysis Officer and Project Manager BOEM, Alaska OCS Region
3801 Centerpoint Drive,
Suite 500
Anchorage, Alaska 99503

December 22, 2014

Dear Mr. Routhier,

I am a statistician who wrote my PhD dissertation about bowhead whales. I read with interest the Lease Sale 193 Draft SEIS. In general, I was impressed with the document's scope and depth. Your team of authors is to be commended.

In adding my comments about the draft and decision to this, I am framing my analysis based on several related criteria stated within the Draft. All page citations are from the Draft SEIS. Specifically,

1. "The Department of the Interior has responsibility for … fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation" (Closing page).

2. "Balancing the protection of the marine, coastal, and human environments with the need for domestic energy resources is a focus of responsible development of the energy and minerals resources of the Arctic Region.… The Department of the Interior has the legal responsibility to protect the marine, coastal, and human environments from serious harm of continued OCS energy exploration and development activities (43 U.S.C. §1334). This responsibility is incorporated in both BOEM and BSEE missions" (p. 409).

3. In "Managing for the Future in a Rapidly Changing Arctic, A Report to the President" Clement, Bengtson, and Kelly (2013), advocated for an "holistic, integrated approach to management" in the Arctic, including "science-based decision-making focused on ensuring sustainable ecosystems" and "improved understanding and consideration of cumulative impacts of human activities in the Arctic… The report emphasized that decisions should be science-based and focused on ensuring sustainable ecosystems and continuity of ecosystems functions and services by:

"□ Identifying and protecting areas of significant ecological or cultural importance and/or sensitivity, along with the variables that define them
"□ Using the best available science to understand ecological processes, to identify and measure indicators of change, and to make policy and management decisions

"□ Utilizing and integrating traditional knowledge into decision-making
"□ Investing in research that meets the needs of managers and stakeholders, and coordinating data collection and analysis across the U.S. Arctic
"□ Using precaution in decision-making, especially where the health, productivity, and resilience of ecosystems may be compromised" (p. 411)

4. The National Strategy for the Arctic Region includes responsible Arctic region stewardship, protecting the Arctic environment, conserving Arctic natural resources, and consulting with Alaska Natives in its guiding principles (p. 412-413).

5. In particular reference to the last guiding principle, it is worth noting that the concerns about the risks of oil spills and the loss of subsistence hunting, cultural changes, and population influx from development (p. 129-130) are non-trivial. Furthermore, the Iñupiat warrant consideration under the environmental justice initiative to "promote fair treatment of people of all races and income levels, so no person or group of people bears a disproportionate share of the negative effects from a country's domestic and foreign programs… Any disproportionately high adverse impacts to a NSB or NWAB community are considered 'significant' [environmental justice] impacts" (p. 382).

6. Finally, "operators shall not create conditions that will pose unreasonable risks to public health, life, property, aquatic life, wildlife, recreation, navigation, commercial fishing, or other uses of the ocean" (p. 10).

In short, the decision of whether to affirm the lease should rest on ecological ramifications and environmental justice as much as it does on economics and energy security. I consider each in turn.

Ecological Ramifications

Unsurprisingly, the Proposed Action causes environmental harm at all stages of the process and at many environmental levels. Harm comes in several forms, from the dramatic large oil spill to the long term effects of noise and sediment disturbance over the expected 77 year project lifespan. "It is reiterated that about 800 small oil spills and 1-2 large oil spills [>1,000bbls] …may occur at any time from the commencement of exploration drilling to the cessation of production" (pp. 155-156). BOEM anticipates long term and widespread negative impacts to water quality, lower trophic level organisms (in the expected case of a large offshore spill), bowhead whales, and vegetation and wetlands (again, in the expected case of a large onshore spill). Furthermore, BOEM predicts that fish, and marine and coastal birds, including those listed under the ESA, face major negative impacts, that is, impacts which result in 'clear, long lasting changes in their function in the ecosystem or cultural context' (p.158). Even without a VLOS, the ecological consequences of the Proposed Action are significant, belying claims that

drilling for oil can be done with no harm to the environment, as is so carefully documented in the 400pp of Chapter 4.

With a 75% chance of at least one large oil spill, many of the possible negative impacts become much greater, moving from moderate (again, meaning "long-term and wide spread") to major. One issue that is glossed over in the analysis is that after a large oil spill, roughly half the oil is expected to remain after 30 days. Furthermore, 3-16% of the spilled oil may disperse, but "disperse" only means that it is present in smaller amounts in a larger area or volume of water, not that it disappears from the system.

Another concern I have with the SEIS Draft is the way the effects of climate change are handled. The climate impacts from this Scenario are based only on the emissions resulting from extracting the oil and gas and do not include the reasonable associated impacts of the burning of the 4.3Bbbls of oil or associated gas.

The cumulative effects section of the Draft considers the impacts of the Proposed Action in the context of other developments, past, present, and potential, in the region, as well as already occurring climate change. Often the impacts of this proposal are dwarfed by larger forces, particularly climate change. This does not make the impacts of this Action any smaller. Furthermore, while the impact producing factors were analyzed over the 5 phases of production, there was discussion of the cumulative impact of 77 years of a factor having a moderate impact on a natural resource.

Given the analyses presented in Chapter 4 of the Draft, there is a large logical inconsistency in the statement on p. 565, "The analysis of the Scenario found that oil exploration, development, and production/ decommissioning activities would entail some impacts to nearly all resource areas. In each case, the potential for impacts to long-term productivity is solely derived from the risk of a large-scale oil spill. The one exception to this is archaeological resources."

Environmental Justice

The environmental justice concerns this Proposed Activity raise are expected to be major for the Iñupiaq, with the effects on bowhead whales, fish, and birds, as well as landscape changes and community upheaval resulting in large effects on subsistence hunting, sociocultural systems, and public and community health. The statement that "anticipated effects from oil and gas activities to environmental justice may range from minor to moderate, depending on the phase and nature of the activities," is wholly inconsistent when subsistence harvest patterns, sociocultural patterns and public and community health are each expected to face major negative impacts, especially with the 75% of one or more large oil spills on and/or offshore. As delineated in the Draft (emphasis added):

> Pipeline construction and placement would have effects on subsistence resource habitats and hunting area access. Effects from these would cause impacts due to displacement and can cause a reduction of or no access to, traditional hunting areas potentially resulting in more difficult or less successful harvests. *A permanent loss of resource or traditional hunting use habitats from displacement could persist across seasons*. Other resources such as bowhead and beluga whales, seal, walrus, fish, and birds, could be affected during open water season construction activities (p. 337).
>
> Effects from large oil spills or disturbance/ displacement along the 300-mile onshore pipeline route would persist across seasons… [L]arge spills could affect subsistence patterns by reducing populations or availability of a subsistence-harvest resource, contaminating subsistence resource habitats, creating a perception of tainting and tainting concerns, and rendering resources as unfit to eat. These effects could reduce the amount of subsistence foods harvested, cause changes in traditional diets, and increase risks along with wear and tear on equipment if users traveled farther to obtain subsistence resources. *Should any resource population decline, the potential impact to communities who rely on subsistence would be severe. Overall, the activities conducted during this time period are anticipated to have a major impact on subsistence-harvest patterns since the subsistence resources could become undesirable or potentially reduced in numbers, making them unavailable*" (p. 346).
>
> "Iñupiat Natives, a recognized minority, are the predominant residents of Chukchi Sea coastal communities in the North Slope Borough and in the Northwest Arctic Borough (NWAB), the area potentially most affected by the Leased Area and subsequent activities. Effects on Iñupiat Natives would occur due to their reliance on subsistence foods, and cumulative effects may affect subsistence-harvest patterns. …Sources that could affect subsistence-harvest patterns include potential increased seismic-survey activity, oil spills, noise and traffic disturbance, and disturbance from construction activities associated with ice roads, production facilities, pipelines, gravel mining, and supply efforts. …In the event of a large spill, many harvest areas and some subsistence resources would be unavailable for use. Some resource populations could suffer losses and, as a result of tainting, bowhead whales could be rendered unavailable for use. *Major additive effects could occur when impacts from contamination of the shoreline, tainting concerns, cleanup disturbance, and disruption of subsistence practices are factored together. One or more important subsistence resources would become unavailable or undesirable for use for 12 years, a major effect* (p. 645).

The potential level of impacts to sociocultural systems and to public and community health are listed as moderate to major for the bulk of the 77 year Scenario, and then downgraded to moderate overall because "spills do not frequently occur" (p. 364 and 381). Given that an oil spill can result in the permanent loss of resources needed by the Iñupiaq, and that there is a 75% probability of at least one large oil spill occurring, I believe that "moderate" is an incorrect assessment.

Economics

The economic arguments that oil production only produces positive economic impacts is an oversimplification. While "the Scenario would cause long-lasting and widespread increases in employment and labor income over many years" (pp. 37-38), it is important to ask if those who assume the environmental risks of the oil drilling and production will meaningfully participate in the economic benefits. Historically, that has not been the case, as "very few North Slope residents have been employed by the oil and gas industry or supporting industries in and near Prudhoe Bay since production started in the 1970s. Local residents represent only about one percent of those hired for North Slope oil industry related jobs, with most North Slope oil-industry workers residing outside the NSB" (p. 98). In this Scenario "peak direct local employment is estimated to be 422 job years and occur in Year 2043" (p. 319), again a tiny fraction of the total number created. At a price per barrel of $110 and an average offshore production cost of $51.60 (according to US IEA), those 4.3Bbbs result in a profit of $251 billion over 74 years to the oil companies. While Alaska and specifically the North Slope will assume all the environmental risk for the oil production, on average annually 50% of the direct jobs and income will be out of state, with an annual average of 1.7% of the jobs and less than 1% of the direct income staying in the NSB (Table 4-45, p. 319).

One important question to address is how sustainable that job development and the concomitant building of infrastructure is. As is pointed out in the Draft "As the activities described in the Scenario wind down, NSB and the State could experience a net migration loss, leaving under-utilized or unused public services and infrastructure behind. Boom and bust cycles could also lead to local economies overheating from inflation caused by rapidly increasing wage growth and increasing prices in the NSB and State. Average wages increases in the local economy can lead to increasing prices of goods and services, as businesses have to raise their prices in order to pay their employees higher wages. It is possible that increased employment could also have a negative impact on the participation of local residents in subsistence hunts, as some local residents who would otherwise engage in subsistence activities may instead pursue high-paying oil and gas jobs." (p. 319).

Energy Security

Advocates of moving forward with the Proposed Action also cite energy security concerns. In that light, it is worth pointing out that "BOEM determined that zero production remains the most likely outcome from Lease Sale 193…Additional development and production from Lease Sale 193 leases [beyond the 4.3 Bbbls of recoverable in this Scenario] is not reasonably foreseeable" (p. 24). At a price of $110/barrel, there are an estimated 4.3Bbbl of oil in the lease sale that would be recovered over period of 77 years "from exploration to final production" and assuming no delays due to issues with construction, regulation, or litigation. According to the US Energy

Information Administration (US EIA), the US uses an average of 6.89Bbbl of oil every year. A "back of the envelope calculation" shows that at that usage rate, the oil in Lease 193 represents a little more than 7 months' worth of oil for the country. We are being asked to weigh the risks and benefits of 77 years (28,105 days) of environmental disruption and damage against what amounts to 228 days' worth of oil, less than 1% of what we will use during that time frame (again, assuming current usage rates).

Based on the Department of the Interior's stated purpose, legal responsibilities, the National Strategy for the Arctic Region, environmental justice concerns, and the risks to public health, life, property, aquatic life, wildlife, BOEM's own analysis has shown this Proposed Action presents too much environmental risk for too little economic reward.

Sincerely,

Susan C. Lubetkin, PhD

PUBLIC SUBMISSION

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Comment from George Donart, NA

Submitter Information

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General Comment

The SEIS is deficient in that it does not fully examine the effects of burning all the oil that might be recovered as part of the sale. The SEIS needs to thoroughly examine the effects of the combustion of the sales oil on the atmosphere and climate locally, nationally and internationally. The conclusions of the most recent Intergovernmental Panel on Climate Change report are clear: most fossil fuel reserves must remain in the ground if we are to avoid the worst effects of global warming. The findings of the 5th IPCC reports need to be incorporated and closely examined in the SEIS.

By the same token, the rapid acidification by carbon pollution of both polar and non-polar ocean waters must be addressed by the SEIS. A number of related OA effects from the burning of fossil fuels are widely recognized by national and international scientific panels. Ocean acidification (OA) is caused by carbon dioxide emissions from human activity to the atmosphere that end up in the ocean. Furthermore, the capacity of the worlds marine waters to act as carbon sinks decreases as they acidifies, though reducing CO2 emissions will slow the progress of ocean acidification. The legacy of fossil fuel emissions on ocean acidification will be encountered for centuries.

If CO2 pollution continues on the current trajectory, coral reef erosion is likely to outpace reef building some time this century. Coral communities in colder water regions are particularly at risk and may be unsustainable. Molluscs are one of the most sensitive groups to ocean acidification. The shells of marine snails known as pteropods, an important link in the marine food web, are already dissolving.

The varied responses of species to ocean acidification compounded by other stressors are likely to lead to changes in marine ecosystems, to such an extent that is difficult to predict.

Negative socio-economic impacts on coral reefs are expected, but the scale of the costs is uncertain. Declines in shellfisheries will lead to economic losses, but the extent of the losses is uncertain. Ocean acidification may have some direct effects on fish behavior and physiology.

Warming ocean waters due to anthropogenic warming have already started to lead to ecosystem shifts away from cold water fishes to tropical and semi-tropical species. Fisheries provide three Billion people with around 20% of their average intake of animal protein, and 400 million depend critically on fish for food. Projected climate change impacts on fisheries and aquaculture are negative on a global scale; severely so in many regions. Estimates of loss of landings to global fisheries as a result of climate change until 2050 range between USD 17 and 41 billion, based on only a 2C global temperature increase.

The current scientific consensus is that anthropogenically forced climate change is warming the planet and contributing to sea level rise (SLR). Sea level rise has already American cities and national security sites around the globe. The recent NOAA report on the increasing incidence of flooding due to SLR in coastal communities is accelerating on the East coast and increasing linearly on the West coast. The Red Cross has tracked a quadrupling of disaster-scale flooding in just the last 25 years.

Even though this lease sale only covers a portion of the OCS in the Chukchi Sea, its development will act as the gateway to extraction of all the neighboring reserves. For this reason, analysis by BOEM for this EIS in relation to the climate, OA and SLR effects must include the effect of eventual exploration, extraction, combustion of the entire Chukchi reservoir system.

Another deficiency of the SEIS is that it does not include an alternative whereby non-fossil fuel energy becomes a much more robust and common fuel for transportation. The EIS must develop Alternatives that include the transition to non-carbon based energy, such as renewables and nuclear energy. These alternatives must include existing and cutting edge technology, as well as technology innovation patterns and trends. They must incorporate long-term price trends of non-oil energy sources as well as realistic economic models that include replacing domestic oil use over the long term. The cost of oil subsidies in the form of free pollution of the atmosphere must be included.

Examples would include the recent reports that wind is now the cheapest source of electricity in the United States on a per kWh basis; the major manufacturing expansions (giga-factories) for both large batteries and solar panels; the strong market for electric automobiles.

The BOEM, to have a complete and useful analysis, must address the effects of climate change, ocean acidification and warming, as well as sea level rise due to combustion of the oil under the Chukchi Sea. An alternative must also be developed that is truly an alternative to the use of oil as a transportation fuel, not just a no-action option.

Sincerely,
George Donart

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Comment from Doris Stepka, NA

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General Comment

With increased oil and natural gas development, the United States has seen something of a manufacturing renaissance. Lower energy costs mean lower input costs to run factories and businesses so it stands to reason that domestic Arctic energy resources will only serve to further that growth, bringing more manufacturing jobs back to the lower 48.

That is why it is my sincere hope that you will act without hesitation to issue a Record of Decision on the BOEM Draft Supplemental Environmental Impact Statement. It has been six years of delays and due diligence; it is now time to act.

APPENDIX F

Air Quality Methodology and Data

Explanation of Tables

Tables

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Appendix F. Air Quality Assessment Background Models

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F-1. BOEM Air Emissions Calculations and Dispersion Analysis

The images included in this appendix allow inspection of the data and methods used to calculate the potential projected emissions shown in the tables in Section 4.3.2 that disclose the year of greatest potential projected emissions during each period of the Scenario. Included here are details of the dispersion analysis that supports the characterization of the air quality impacts resulting from potential projected emissions. The spreadsheets are consistent with the Scenario described in Appendix B, Table B-2, and are supplemented by data reported in, "Arctic Air Quality Modeling Study: Emissions Inventory – Final Task Report" (OCS Study BOEM 2014-1001), prepared for BOEM by the environmental consulting firm Eastern Research Group, Inc. (ERG). The report can be found on the BOEM Website at http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5441.pdf

Projecting air quality impacts from various sources of emissions anticipated under the Scenario involves thousands of iterations of calculations resulting in numerous spreadsheets. Each set of spreadsheets is introduced by a cover sheet showing the planning details for the activity (e.g. offshore marine surveys, exploration drilling, etc., and the number of days of operation). A list of acronyms and conversions used throughout the analysis is provided in Figure F-2. The list of emissions factors for all potential activities (unless otherwise noted) is shown in Figure F-6. The first page of each spreadsheet indicates the date, BOEM preparer, and the type of activity analyzed in the spreadsheets that follow..
The images show the data used for the general EPA-approved equation for calculating projected emissions:

$$E_{p_s} = EF_{p_s}\ in\ \frac{g}{hp-hr} \times Hrs_s \times HP_{e_s} \times LF_{e_s}$$

Where, E_{p_s} is the potential projected emissions, by pollutant ($_p$) and for source ($_s$), EF_{p_s} is the emissions factor for the pollutant and source, Hrs_s is the total hours the source is expected to operate, HP_{e_s} is the horsepower of the engine associated with the source, and LF_{e_s} is the load factor for the engine associated with the source, 80% where noted The solution is converted in the spreadsheets from grams per source, to pounds per source, to short tons per source; except that greenhouse gas emissions (GHG) are provided in metric tons.

F-2. Marine, Geophysical, Geological, or Geotechnical Survey Including Offshore and Land-Based Work

Example Scenario Activity - Marine, Geophysical, Geological, & Geotechnical Survey			BOEM
TODAY'S DATE	January 22, 2015	Version:	New
TITLE OF THE SURVEY	2014LS193 Scenario		
SURVEY COMPANY NAME	BOEM		
COMPANY LOCATION	Anchorage, AK		
PLAN TYPE	Survey		
PLAN DATE			
LOCATION	Chukchi Sea		
TOWNSHIP AND RANGE	Principal Meridian		
DATE(S) OF OPERATION	Valid for Open Water and On-Ice Surveys		
NUMBER OF DAYS EACH YEAR	100 days		
MINIMUM OPERATING DISTANCE FROM SHORE	1 statute miles		
BOEM PREPARER CONTACT INFORMATION:			
NAME	Virginia Raps		
TITLE	Meteorologist		
TELEPHONE NUMBER	907-334-5256		
EMAIL	virginia.raps@boem.gov		

REMARKS

The calculations in this workbook are for one survey, where the data for one survey is valid for any type of survey: marine, geophysical, geological, or geotechnical
Includes land-based work. Emission factors are uncontrolled.
Engines operating at 100% and not reduced to 80%.

Figure F-1. Survey Emissions Analysis Cover Sheet.

Chukchi Sea
Survey
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

BOEM

Conversions and Acronyms

Acronyms	*Conversions*			
Btu is British thermal unit	1	Btu-hr =	0.000393015	hp-hr
CH_4 is methane, a GHG	1	Btu-hr =	0.000293071	kW-hr
CO is carbon monoxide	1	gal diesel =	7.37	lbs
CO_2 is carbon dioxide, a GHG	1	gallon =	3785.4118	grams
g is grams	1	gram =	0.002204623	pounds
g/gal is grams of pollutant per gallon of fuel burned	1	gram =	0.000264172	gallon
g/hp-hr is grams of pollutant per engine horsepower - hours of operation	1	hp =	0.745699871	kW
GHG is greenhouse gases	1	hp-hr =	3785.4118	Btu/hr
HP is horsepower	1	hp-hr =	0.745699872	kW
kw is kilowatt	1	kW =	1.34102209	hp
lb is pounds	1	kW-hr =	1.341022089	Btu/hr
N_2O is nitrous oxides, a GHG	1	kW-hr =	1.013890297	hp-hr
NH_3 is ammonia	1	metric HP =	0.9863	hp, mechanical (imperial)
NO_x is nitrogen oxides; BOEM assumes NO_x is comprised entirely of NO_2	1	metric ton =	2204.622622	lbs
$PM_{10\&2.5}$ denotes that $PM_{2.5}$ emissions factors are not available; $PM_{2.5}$ assumed to equal PM_{10} emissions	1	MMBtu/hr =	1000000	Btu/hr
SO_2 is sulfur dioxide and includes the family of SO_x emissions	1	pound =	454	grams
VOC is volatile organic compounds	1	pound =	0.000453592	metric tons
GWP is global warming potential	1	short ton =	2000	pounds

Conversions and Acronyms

Figure F- 2. Acronyms and Conversion Factors for All Potential Scenario Activities.

Survey
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Potential Vessels

BOEM

Potential Vessel Engine Characteristics

POTENTIAL VESSEL NAME	POTENTIAL VESSEL USE OR PURPOSE	NBR OF ENG	POTENTIAL ENGINES								TOTAL HP	FUEL TYPE
			MAIN PROPULSION				AUXILIARY					
			Make/Model	HP	Nbr Eng.	SubTotal HP	Make/Model	HP	Nbr Eng.	SubTotal HP		
R/V Peregrine	Source Vessel	1	Cummins QSL9	405	3	1215	Cummins QSC8.3-305	305	1	305	1520	Diesel
M/V Arctic Wolf	Source Vessel	1	Caterpillar 3406	465.5336	3	1396.6008	Caterpillar 3304	95	2	190	1587	Diesel
M/V Miss Diane	Node equipment deployment and retrieval (24-hour operation)	1	John Deere	305	2	610	Northern Lights	95	1	95	705	Diesel
M/V Mark Stevens	Node equipment deployment and retrieval (24-hour operation)	1	John Deere	375	2	750	John Deere	53.6	2	107.2	857.2	Diesel
Nautilus II	Node equipment deployment and retrieval (24-hour operation)	1	Detroit 12V92	465	2	930	John Deere	26.8	2	53.6	857.2	Diesel
M/V Dreamcatcher	Mitigation/Housing Vessel	1	VOLVO	380	2	760	John Deere	254	1	190	950	Diesel
F/V Cape Fear	Crew Transport Vessel (intermittent operation)	1	CAT 3406	700	1	700	Lugger	26.8	1	26.8	726.8	Diesel
Bow Picker (similar to an All American 32' bow picker)	Node deployment and retrieval (intermittent operation)	1	Volvo TAMD61A	306	2	612					612	Diesel
Bow Picker (similar to an All American 32' bow picker)	Node deployment and retrieval (intermittent operaton)	1	Volvo TAMD61A	306	2	612					612	Diesel
MSV Nordica	Icebreaker and platform supply vessel	1	Wartsila 16V32D	8046	2	16092					20517	Diesel
			Wartsilla 12V32D	6035	2	12070	Brunvoll FU-80 LTC-2250 Bow Thrusters	1475.1	3	4425.36	10460.36	
TOTAL	**Potential Total Ships**	10						**Potential Total HP**			**39,404.52**	

Assume all engines onboard a single vessel operate the same number of hours.

Figure F- 3. Potential Vessel Information for Surveys Spreadsheet.

Survey
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Potential Use of Onshore Vehicles and Equipment

BOEM

Ref: BOEM SAE 2014 G&G On-Ice Survey

Emissions from the types of diesel-powered equipment and vehicles proposed for the Proposed Action are typically calculated based on the number of hours each unit is operated, the maximum power rating of each engine expressed in horsepower or kilowatts, and the application of an emission factor in units of grams of pollutant per horsepower, per hour of operation of the engine. However, the expected uncertainty of ground and weather conditions that would cause inconsistent use of the equipment, and the many different types of vehicles and engines, all with varying engine power, makes calculating emissions based on fuel-use a much more efficient and accurate approach to calculating the total projected emissions inventory. The isolated location of the Proposed Action allows the volume of fuel consumed to be accurately recorded, and data reflecting the exact characteristics of each engine powered by the fuel would be unnecessary. As the fuel would be transported to the project staging area and stored until used, there would be no other access to diesel fuel available.

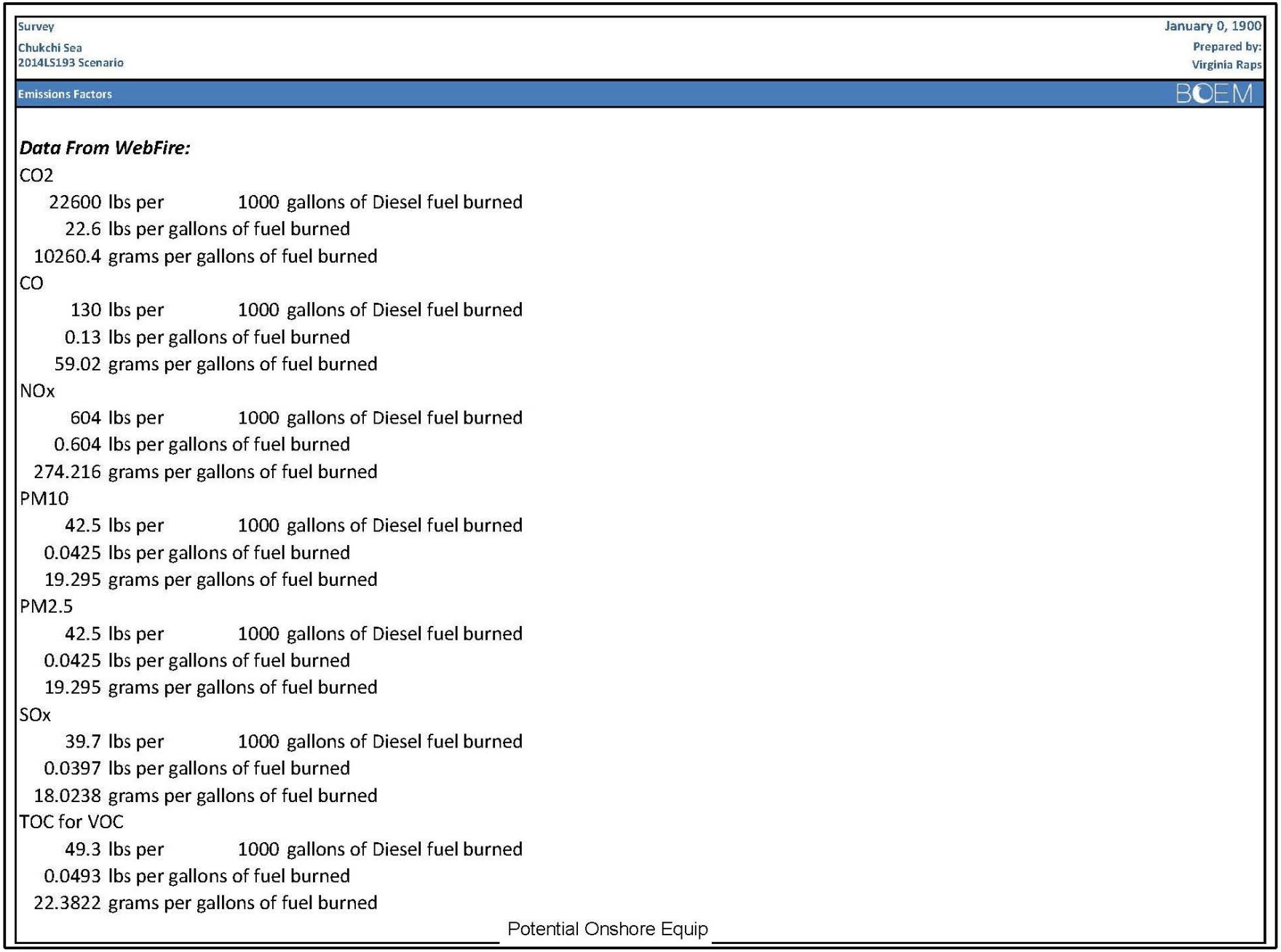
Kuukpik SAE estimates consumption of 4,500 gallons of ULSD fuel each day of operation. Thus, the total fuel consumption for approximately 106 days of operation would require 477,000 U.S. gallons, or 1805.64 kiloliters (kl) of ULSD fuel. The equation to project emissions is shown in Equation (1).

(Eq. 1) $E_p = (EF_p \times F_t) / 2000$

where, E_p is the total projected emissions of each pollutant emitted throughout the operation of the Proposed Action, EF_p is the emission factor for Emission factors applied for the calculation of total emissions were obtained from the U.S. Environmental Protection Agency (EPA) Internet Web

4500	gallons diesel fuel each day
90	days
405000	gallons of diesel fuel consumed for the entire survey

Figure F- 4. On-Ice Survey Emissions Factors Spreadsheet 1.



Survey
Chukchi Sea
2014LS193 Scenario

January 0, 1900
Prepared by:
Virginia Raps

Emissions Factors

BOEM

Data From WebFire:

CO2
22600 lbs per 1000 gallons of Diesel fuel burned
22.6 lbs per gallons of fuel burned
10260.4 grams per gallons of fuel burned

CO
130 lbs per 1000 gallons of Diesel fuel burned
0.13 lbs per gallons of fuel burned
59.02 grams per gallons of fuel burned

NOx
604 lbs per 1000 gallons of Diesel fuel burned
0.604 lbs per gallons of fuel burned
274.216 grams per gallons of fuel burned

PM10
42.5 lbs per 1000 gallons of Diesel fuel burned
0.0425 lbs per gallons of fuel burned
19.295 grams per gallons of fuel burned

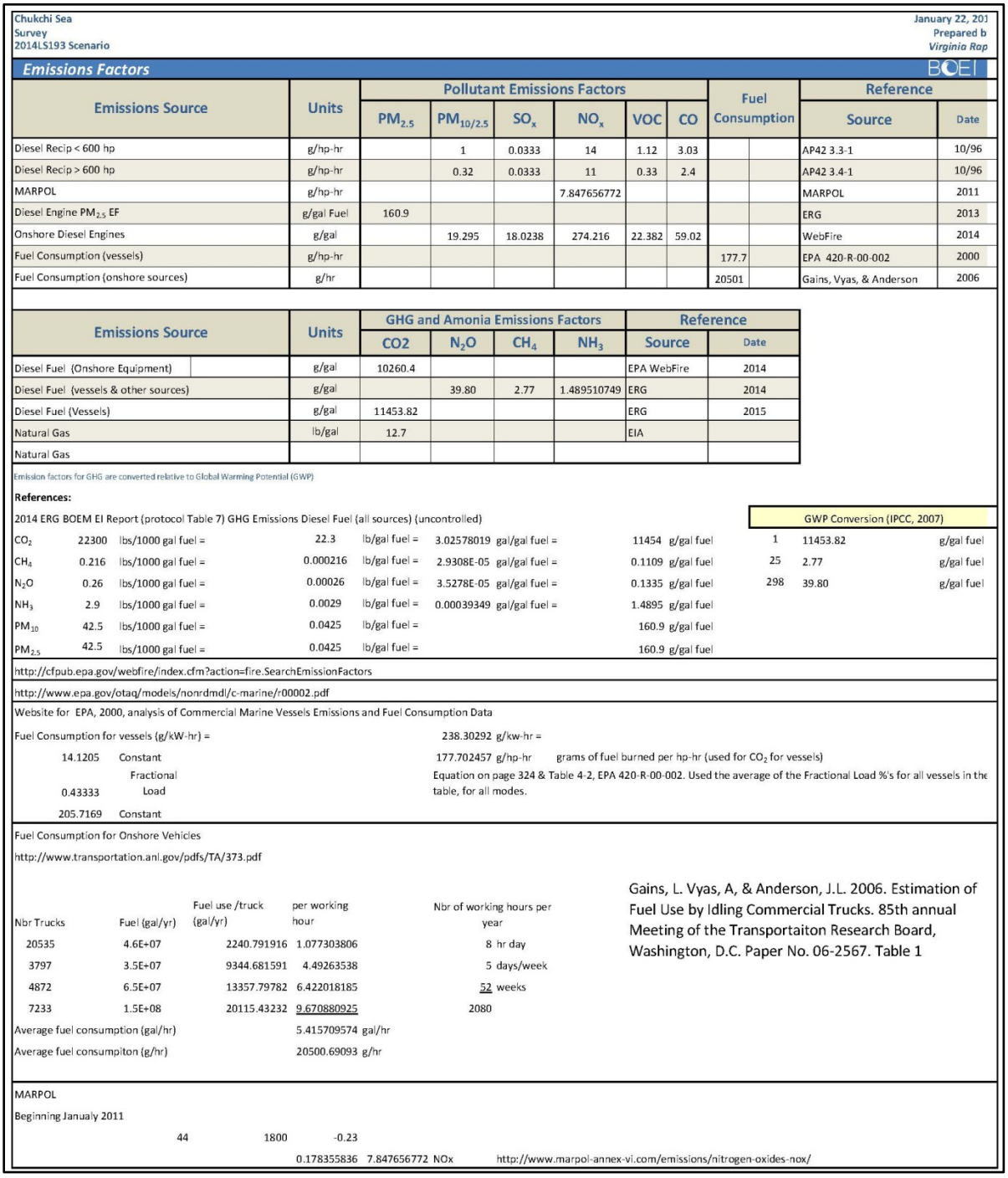
PM2.5
42.5 lbs per 1000 gallons of Diesel fuel burned
0.0425 lbs per gallons of fuel burned
19.295 grams per gallons of fuel burned

SOx
39.7 lbs per 1000 gallons of Diesel fuel burned
0.0397 lbs per gallons of fuel burned
18.0238 grams per gallons of fuel burned

TOC for VOC
49.3 lbs per 1000 gallons of Diesel fuel burned
0.0493 lbs per gallons of fuel burned
22.3822 grams per gallons of fuel burned

Potential Onshore Equip

Figure F- 5. On-Ice Survey WebFire Emissions Factors for Burned Diesel Fuel Spreadsheet 2 and Final.



Chukchi Sea
Survey
2014LS193 Scenario

January 22, 201
Prepared b
Virginia Rap

Emissions Factors BOEI

Emissions Source	Units	Pollutant Emissions Factors						Fuel Consumption		Reference	
		$PM_{2.5}$	$PM_{10/2.5}$	SO_x	NO_x	VOC	CO			Source	Date
Diesel Recip < 600 hp	g/hp-hr		1	0.0333	14	1.12	3.03			AP42 3.3-1	10/96
Diesel Recip > 600 hp	g/hp-hr		0.32	0.0333	11	0.33	2.4			AP42 3.4-1	10/96
MARPOL	g/hp-hr				7.847656772					MARPOL	2011
Diesel Engine $PM_{2.5}$ EF	g/gal Fuel	160.9								ERG	2013
Onshore Diesel Engines	g/gal		19.295	18.0238	274.216	22.382	59.02			WebFire	2014
Fuel Consumption (vessels)	g/hp-hr							177.7		EPA 420-R-00-002	2000
Fuel Consumption (onshore sources)	g/hr							20501		Gains, Vyas, & Anderson	2006

Emissions Source	Units	GHG and Amonia Emissions Factors				Reference	
		CO2	N_2O	CH_4	NH_3	Source	Date
Diesel Fuel (Onshore Equipment)	g/gal	10260.4				EPA WebFire	2014
Diesel Fuel (vessels & other sources)	g/gal		39.80	2.77	1.489510749	ERG	2014
Diesel Fuel (Vessels)	g/gal	11453.82				ERG	2015
Natural Gas	lb/gal	12.7				EIA	
Natural Gas							

Emission factors for GHG are converted relative to Global Warming Potential (GWP)

References:

2014 ERG BOEM EI Report (protocol Table 7) GHG Emissions Diesel Fuel (all sources) (uncontrolled)

									GWP Conversion (IPCC, 2007)		
CO_2	22300	lbs/1000 gal fuel =	22.3	lb/gal fuel =	3.02578019	gal/gal fuel =	11454	g/gal fuel	1	11453.82	g/gal fuel
CH_4	0.216	lbs/1000 gal fuel =	0.000216	lb/gal fuel =	2.9308E-05	gal/gal fuel =	0.1109	g/gal fuel	25	2.77	g/gal fuel
N_2O	0.26	lbs/1000 gal fuel =	0.00026	lb/gal fuel =	3.5278E-05	gal/gal fuel =	0.1335	g/gal fuel	298	39.80	g/gal fuel
NH_3	2.9	lbs/1000 gal fuel =	0.0029	lb/gal fuel =	0.00039349	gal/gal fuel =	1.4895	g/gal fuel			
PM_{10}	42.5	lbs/1000 gal fuel =	0.0425	lb/gal fuel =			160.9	g/gal fuel			
$PM_{2.5}$	42.5	lbs/1000 gal fuel =	0.0425	lb/gal fuel =			160.9	g/gal fuel			

http://cfpub.epa.gov/webfire/index.cfm?action=fire.SearchEmissionFactors

http://www.epa.gov/otaq/models/nonrdmdl/c-marine/r00002.pdf

Website for EPA, 2000, analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data

Fuel Consumption for vessels (g/kW-hr) = 238.30292 g/kw-hr =

14.1205 Constant
0.43333 Fractional Load
205.7169 Constant

177.702457 g/hp-hr grams of fuel burned per hp-hr (used for CO_2 for vessels)

Equation on page 324 & Table 4-2, EPA 420-R-00-002. Used the average of the Fractional Load %'s for all vessels in the table, for all modes.

Fuel Consumption for Onshore Vehicles

http://www.transportation.anl.gov/pdfs/TA/373.pdf

Gains, L. Vyas, A, & Anderson, J.L. 2006. Estimation of Fuel Use by Idling Commercial Trucks. 85th annual Meeting of the Transportaiton Research Board, Washington, D.C. Paper No. 06-2567. Table 1

Nbr Trucks	Fuel (gal/yr)	Fuel use /truck (gal/yr)	per working hour	Nbr of working hours per year
20535	4.6E+07	2240.791916	1.077303806	8 hr day
3797	3.5E+07	9344.681591	4.49263538	5 days/week
4872	6.5E+07	13357.79782	6.422018185	52 weeks
7233	1.5E+08	20115.43232	9.670880925	2080
Average fuel consumption (gal/hr)			5.415709574 gal/hr	
Average fuel consumpiton (g/hr)			20500.69093 g/hr	

MARPOL

Beginning Janualy 2011

44	1800	-0.23			
		0.178355836	7.847656772	NOx	http://www.marpol-annex-vi.com/emissions/nitrogen-oxides-nox/

Figure F- 6. Emissions Factors for All Potential Scenario Activities.

Note: These emissions factors are used unless otherwise noted in the spreadsheets.

Survey
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Poteential Vessels, Engine Controls, and Fuel Consumed

POTENTIAL VESSEL NAMES	VESSEL USE OR PURPOSE	POTENTIAL ENGINE CONTROLS				POTENTIAL FUEL CONSUMED	
		Engine Emission Control Equipment	Pct. Engine Operating Power	Final HP	HP Range for Emission Factors	Total Potential Hours	Total Potential Fuel Consumed (gallons)
R/V Peregrine	Source Vessel	None	100.0%	1520	< 600 HP	2400	171,252
M/V Arctic Wolf	Source Vessel	None	100.0%	1586.60	< 600 HP	2400	178,755
M/V Miss Diane	Node equipment deployment and retrieval (24-hour operation)	None	100.0%	705	< 600 HP	2400	79,429
M/V Mark Stevens	Node equipment deployment and retrieval (24-hour operation)	None	100.0%	857.2	< 600 HP	2400	96,577
Nautilus II	Node equipment deployment and retrieval (24-hour operation)	None	100.0%	857.2	< 600 HP	2400	96,577
M/V Dreamcatcher	Mitigation/Housing Vessel	None	100.0%	950	< 600 HP	2400	107,032
F/V Cape Fear	Crew Transport Vessel (intermittent operation)	None	100.0%	726.8	>= 600 HP	57.14	1,950
Bow Picker (similar to an All American 32' bow picker)	Node deployment and retrieval (intermittent operation)	None	100.0%	612	< 600 HP	57.14	1,642
Bow Picker (similar to an All American 32' bow picker)	Node deployment and retrieval (intermittent operaton)	None	100.0%	612	< 600 HP	57.14	1,642
MSV Nordica	Icebreaker and platform supply vessel	None	100.0%	20517.36	>= 600 HP	670	645,322
Tracters, loaders, fuelers, construction equipment, and aircraft	Onshore/On-Ice Equpment	None	100.0%	10460.36	NA	NA	405,000
Total						**Potential Fuel Consumed (gallons)**	**1,785,178**

Emissions from "Tractors, loaders, fuelers, construction equipment, and aircraft" is based on potential fuel consumption.
No emission source controls are applied, including reducing maximum engine load below 100%.

Figure F- 7. Survey Analysis for Engine Controls and Fuel Consumed.

Survey
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
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Emissions Calculations

BOEM

Potential Vessels and Emission Factors

POTENTIAL VESSEL NAMES	Emission Factors (g/hp-hr, except g/gallon of fuel for onshore equpment and GHGs)								
	$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	NH_3	N_2O	CH_4	CO_2
R/V Peregrine	1.00	0.03	7.85	1.12	3.03	1.489511	39.80	2.77	11453.82
M/V Arctic Wolf	1.00	0.03	7.85	1.12	3.03	1.489511	39.80	2.77	11453.82
M/V Miss Diane	1.00	0.03	7.85	1.12	3.03	1.489511	39.80	2.77	11453.82
M/V Mark Stevens	1.00	0.03	7.85	1.12	3.03	1.489511	39.80	2.77	11453.82
Nautilus II	1.00	0.03	7.85	1.12	3.03	1.489511	39.80	2.77	11453.82
M/V Dreamcatcher	1.00	0.03	7.85	1.12	3.03	1.489511	39.80	2.77	11453.82
F/V Cape Fear	0.32	0.03	7.85	0.33	2.40	1.489511	39.80	2.77	11453.82
Bow Picker (similar to an All American 32' bow picker)	1.00	0.03	14.00	1.12	3.03	1.489511	39.80	2.77	11453.82
Bow Picker (similar to an All American 32' bow picker)	1.00	0.03	14.00	1.12	3.03	1.489511	39.80	2.77	11453.82
MSV Nordica	0.32	0.03	7.85	0.33	2.40	1.489511	39.80	2.77	11453.82
Tracters, loaders, fuelers, construction equipment, and aircraft	19.295	18.0238	274.216	22.3822	59.02	1.489511	39.80	2.77	10260.4

Emission factors for GHG are converted relative to Global Warming Potential (GWP)

Figure F- 8. Survey Analysis Emissions Factors Spreadsheet.

Survey
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Emissions Calculations

Potential Vessels and Potential Projected Emissions (grams/survey)

POTENTIAL VESSEL NAMES	POTENTIAL PROJECTED EMISSIONS (g/vessel)								
	$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	NH_3	N_2O	CH_4	CO_2
R/V Peregrine	4.E+06	1.E+05	3.E+07	4.E+06	1.E+07	2.55E+05	6.82E+06	4.75E+05	2.E+09
M/V Arctic Wolf	4.E+06	1.E+05	3.E+07	4.E+06	1.E+07	2.66E+05	7.11E+06	4.96E+05	2.E+09
M/V Miss Diane	2.E+06	6.E+04	1.E+07	2.E+06	5.E+06	1.18E+05	3.16E+06	2.20E+05	9.E+08
M/V Mark Stevens	2.E+06	7.E+04	2.E+07	2.E+06	6.E+06	1.44E+05	3.84E+06	2.68E+05	1.E+09
Nautilus II	2.E+06	7.E+04	2.E+07	2.E+06	6.E+06	1.44E+05	3.84E+06	2.68E+05	1.E+09
M/V Dreamcatcher	2.E+06	8.E+04	2.E+07	3.E+06	7.E+06	1.59E+05	4.26E+06	2.97E+05	1.E+09
F/V Cape Fear	1.E+04	1.E+03	3.E+05	1.E+04	1.E+05	2.90E+03	7.76E+04	5.41E+03	2.E+07
Bow Picker (similar to an All American 32' bow picker)	3.E+04	1.E+03	5.E+05	4.E+04	1.E+05	2.45E+03	6.53E+04	4.55E+03	2.E+07
Bow Picker (similar to an All American 32' bow picker)	3.E+04	1.E+03	5.E+05	4.E+04	1.E+05	2.45E+03	6.53E+04	4.55E+03	2.E+07
MSV Nordica	4.E+06	5.E+05	1.E+08	5.E+06	3.E+07	9.61E+05	2.57E+07	1.79E+06	7.E+09
Tracters, loaders, fuelers, construction equipment, and aircraft	8.E+06	7.E+06	1.E+08	9.E+06	2.E+07	6.03E+05	1.61E+07	1.12E+06	4.E+09

Figure F- 9. Survey Analysis Emissions Calculations Spreadsheet 1.

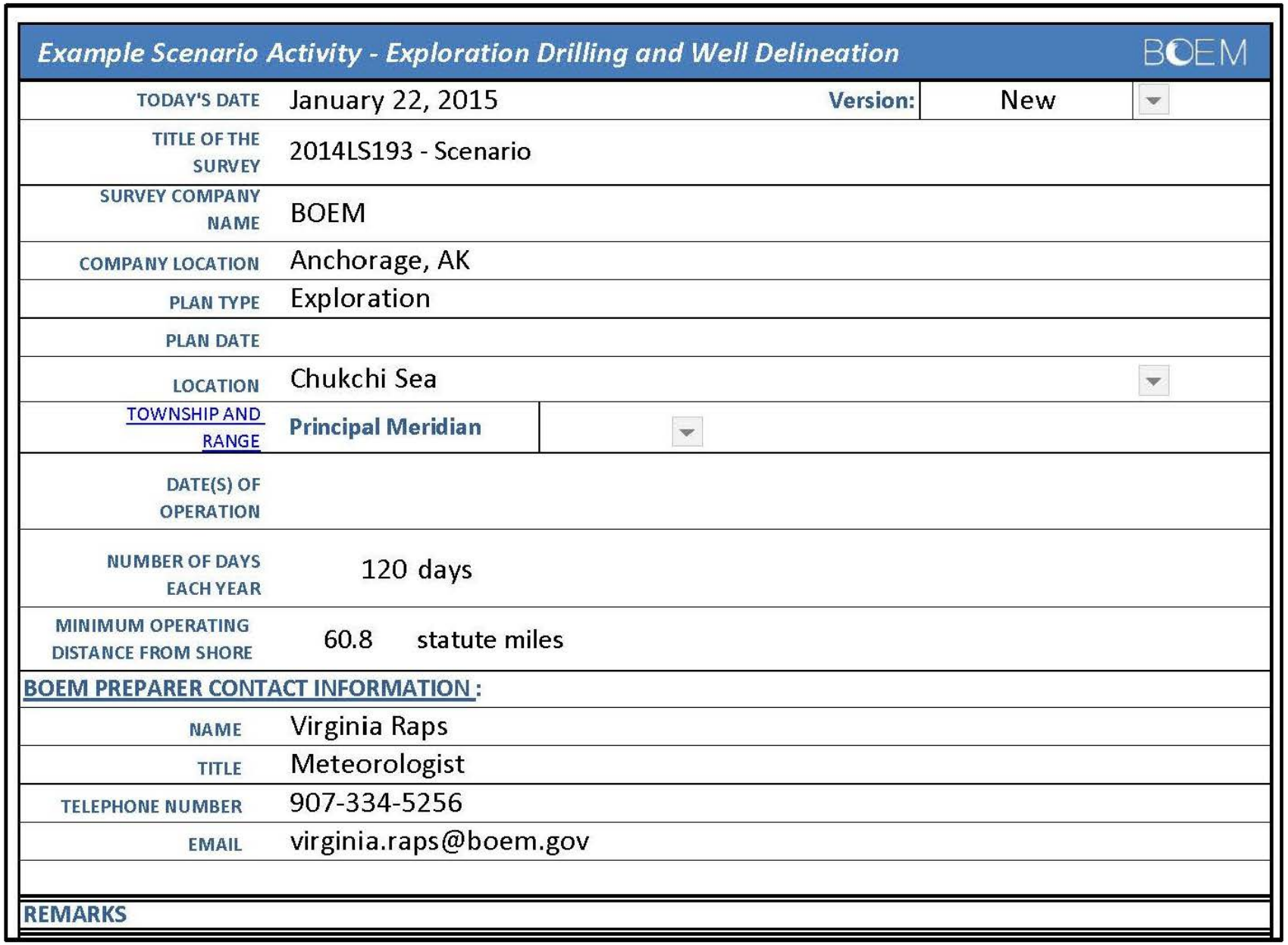
Survey									January 22, 201
Chukchi Sea									Prepared by
2014LS193 Scenario									Virginia Rap
Emissions Calculations									
Potential Vessels and Potential Projected Emissions (pounds/survey)									
POTENTIAL VESSEL NAMES	POTENTIAL PROJECTED EMISSIONS (lbs per vessel)								
	$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	NH_3	N_2O	CH_4	CO_2
R/V Peregrine	8042	268	63114	9008	24369	562	15025	1047	4324341
M/V Arctic Wolf	8395	280	65880	9402	25436	587	15683	1093	4513817
M/V Miss Diane	3730	124	29273	4178	11303	261	6969	486	2005697
M/V Mark Stevens	4536	151	35593	5080	13743	317	8473	591	2438701
Nautilus II	4536	151	35593	5080	13743	317	8473	591	2438701
M/V Dreamcatcher	5027	167	39447	5630	15230	351	9390	654	2702713
F/V Cape Fear	29	3	719	30	220	6	171	12	49231
Bow Picker (similar to an All American 32' bow picker)	77	3	1079	86	234	5	144	10	41455
Bow Picker (similar to an All American 32' bow picker)	77	3	1079	86	234	5	144	10	41455
MSV Nordica	9698	1009	237832	10001	72735	2119	56617	3946	16295262
Tracters, loaders, fuelers, construction equipment, and aircraft	17228	16093	244840	19984	52697	1330	35532	2476	9161226

Figure F- 10. Survey Analysis Emissions Calculations Spreadsheet 2.

Survey Chukchi Sea 2014LS193 Scenario									January 22, 2015 Prepared by: Virginia Raps	
Emissions Calculations										
Potential Vessels and Potential Projected Emissions (short tons/survey); except metric tons/survey for GHGs										
POTENTIAL VESSEL NAMES	POTENTIAL PROJECTED EMISSIONS (tons per vessel)									
	$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	NH_3	N_2O	CH_4	CO_2	CO_{2e}
R/V Peregrine	4.02	0.13	31.56	4.50	12.18	0.28	6.82	0.47	1961.49	1969
M/V Arctic Wolf	4.20	0.14	32.94	4.70	12.72	0.29	7.11	0.50	2047.43	2055
M/V Miss Diane	1.87	0.06	14.64	2.09	5.65	0.13	3.16	0.22	909.77	913
M/V Mark Stevens	2.27	0.08	17.80	2.54	6.87	0.16	3.84	0.27	1106.18	1110
Nautilus II	2.27	0.08	17.80	2.54	6.87	0.16	3.84	0.27	1106.18	1110
M/V Dreamcatcher	2.51	0.08	19.72	2.81	7.62	0.18	4.26	0.30	1225.93	1230
F/V Cape Fear	0.01	0.00	0.36	0.02	0.11	0.00	0.08	0.01	22.33	22
Bow Picker (similar to an All American 32' bow picker)	0.04	0.00	0.54	0.04	0.12	0.00	0.07	0.00	18.80	19
Bow Picker (similar to an All American 32' bow picker)	0.04	0.00	0.54	0.04	0.12	0.00	0.07	0.00		0
MSV Nordica	4.85	0.50	118.92	5.00	36.37	1.06	25.68	1.79	7391.41	7419
Tracters, loaders, fuelers, construction equipment, and aircraft	8.61	8.05	122.42	9.99	26.35	0.66	16.12	1.12	4155.46	4173
Total	30.69	9.13	377.23	34.28	114.97	2.93	71.04	4.95	19944.98	20020.97
	Projected Emissions from a Survey (tons per survey)									
	PM_{10}	SO_2	NO_x	VOC	CO	NH_3	N_2O	CH_4	CO_2	CO_{2e}

Figure F- 11. Survey Analysis Emissions Calculations Spreadsheet 3 and Final.

F-3. Exploration



Example Scenario Activity - Exploration Drilling and Well Delineation			
TODAY'S DATE	January 22, 2015	Version:	New
TITLE OF THE SURVEY	2014LS193 - Scenario		
SURVEY COMPANY NAME	BOEM		
COMPANY LOCATION	Anchorage, AK		
PLAN TYPE	Exploration		
PLAN DATE			
LOCATION	Chukchi Sea		
TOWNSHIP AND RANGE	Principal Meridian		
DATE(S) OF OPERATION			
NUMBER OF DAYS EACH YEAR	120 days		
MINIMUM OPERATING DISTANCE FROM SHORE	60.8 statute miles		
BOEM PREPARER CONTACT INFORMATION:			
NAME	Virginia Raps		
TITLE	Meteorologist		
TELEPHONE NUMBER	907-334-5256		
EMAIL	virginia.raps@boem.gov		
REMARKS			

Figure F- 12. Exploration Drilling and Well Delineation Analysis Cover Sheet.

Exploration
Chukchi Sea
2014LS193 - Scenario

January 22, 2015
Prepared by:
Virginia Raps

Potential Vessels

BOEM

Potential Vessels and Engine Characteristics

POTENTIAL VESSEL GROUP	POTENTIAL VESSEL PURPOSE	NBR OF SHIPS	POTENTIAL ENGINES												
			POTENTIAL ENGINE USE AND PURPOSE	MAIN PROPULSION AND ANCILLARY ENGINES					INCINERATORS AND AUXILIARY/POWER GENERATION ENGINES						TOTAL HP	Fuel Type
				Make/Model	kW	HP	Nbr Eng.	Total HP	Make/Model	kW	HP	Nbr Eng.	Total HP	Control		
MODU	Exploration Drilling	1	Propulsion	STX-MAN 6S42MC7	6480	8690	1	8690		0	0		0	0.8	6952	Diesel
MODU	Exploration Drilling	1	Power Generation	Bergen/KVG-18	13750	18439	1	18439		0	0		0	0.8	14751	Diesel
MODU	Exploration Drilling	1	HPU	MERCEDES/ OM926LA	241	323	2	645			0		0	0.8	516	Diesel
MODU	Exploration Drilling	1	Cranes	LIEBHERR D9508HF485	450	603	2	1207			0		0	0.8	966	Diesel
MODU	Exploration Drilling	1	Cementing Units	DETROIT 8V-71N	250	335	2	671			0		0	0.8	536	Diesel
MODU	Exploration Drilling	1	Logging Unit	CATERPILLAR CU ACERT	224	300	1	300			0		0	0.8	240	Diesel
MODU	Exploration Drilling	1	Compressor	DETROIT 4-71	104	139	1	139			0		0	0.8	112	Diesel
MODU	Exploration Drilling	1	Sidewall Core Tool	JOHN DEERE 4024TF270	43	58	1	58			0		0	0.8	46	Diesel
MODU	Exploration Drilling	1	Emerg. Generator	TEJOS/MTU 12-396	1120	1502	1	1502			0		0	0.8	1202	Diesel
MODU	Exploration Drilling	1	Rescue and Life Boats	MERCEDES/ OM926LA (or similar)	240.5	323	7	2258			0		0	0.8	1806	Diesel
MODU	Exploration Drilling	1	Boilers	AALBORG INDUSTRIES 28.85 MMBtu/hr		862	1	862			0		0	1	862	Diesel
MODU	Exploration Drilling	1	Incinerators	276 lb/hr - General Refuse		0	1		276			1		1	0	
SUPPORT VESSESLS	Ice Management	1	Propulsion and Power Generation		16800	22529	1	22529		0	0		0	0.8	18023	Diesel
SUPPORT VESSESLS	Ice Management	1	Harbour Set Generator		424	569	1	569						0.8	455	Diesel
SUPPORT VESSESLS	Ice Management	1	Boilers	AALBORG INDUSTRIES 9 MMBtu/hr		269	1	269			0		0	1	269	Diesel
SUPPORT VESSESLS	Ice Management	1	Incinerators	154 lb/hr - General Refuse		0	1		154			1		1	0	
SUPPORT VESSESLS	Ice Management	1	Emerg. Engines		240	322	1	322						0.8	257	Diesel
SUPPORT VESSESLS	Anchor Handlers	1	Propulsion and Power Generation		16251	21793	1	21793		6800	9118.9502	1	9118.9502	0.8	24730	Diesel

Figure F- 13. Exploration Drilling Analysis of Potential Vessels' Engines Spreadsheet 1. Note: The vessel groups shown in red font denote separate categories of vessels used for exploration drilling.

SUPPORT VESSELS	Anchor Handlers	1	Ancillary Engines	2498	3350	1	3350		0		0	0.8	2679.898545	Diesel
SUPPORT VESSELS	Anchor Handlers	1	Emergency Engine	320	429	1	429		0		0	0.8	343.301655	Diesel
SUPPORT VESSELS	Anchor Handlers	1	OSR Equipment	190	255	1	255		0		0	0.8	203.8353577	Diesel
SUPPORT VESSELS	Anchor Handlers	1	Emerg. Generator	170	228	1	228		0		0	0.8	182.3790042	Diesel
SUPPORT VESSELS	Anchor Handlers	1	Boilers AALBORG INDUSTRIES 5 MMBtu/hr		149	1	149		0		0	1	149	Diesel
SUPPORT VESSELS	Anchor Handlers	1	Incinerators 276 lb/hr - General Refuse		0	1		276		1		1	0	
SUPPORT VESSELS	Science Vessels	1	Propulsion and Power Generation	7300	9789	1	9789		125	167.62776	1	167.62776	0.8	7966	Diesel
SUPPORT VESSELS	Science Vessels	1	Emerg. Engines	125	168	1	168		0		0	0.8	134	Diesel
SUPPORT VESSELS	Science Vessels	1	Incinerators 88 lb/hr - General Refuse		0	1		88		1		1	0	
SUPPORT VESSELS	Support Tugs	2	Propulsion and Power Generation	8119	10888	1	21776		465	623.57527	1	1247.1505	0.8	18418	Diesel
SUPPORT VESSELS	Arctic Oil Storage Tanker	1	Propulsion and Power Generation	19180	25721	1	25721		0		0	0.8	20577	Diesel
SUPPORT VESSELS	Arctic Oil Storage Tanker	1	Emerg. Engines	295	396	1	396		0		0	0.8	316	Diesel
SUPPORT VESSELS	Arctic Oil Storage Tanker	1	Ancillary Engines	1431	1919	1	1919		0		0	0.8	1535	Diesel
SUPPORT VESSELS	Arctic Oil Storage Tanker	1	Boilers AALBORG INDUSTRIES 53 MMBtu/hr		1583	1	1583		0		0	1	1583	Diesel
SUPPORT VESSELS	Arctic Oil Storage Tanker	1	Incinerators 188 lb/hr - General Refuse		0	1		188		1		1	0	
OIL SPILL RESPONSE	OSR Vessel	1	Propulsion and Power Generation	5420	7268	1	7268		1918	2572.0804	1	2572.0804	0.8	7872	Diesel
OIL SPILL RESPONSE	OSR Vessel	1	Emerg. Engines	125	168	1	168		0		0	0.8	134.102209	Diesel
OIL SPILL RESPONSE	OSR Vessel	1	Ancillary Engines	797	1069	1	1069		0		0	0.8	855.0356846	Diesel
OIL SPILL RESPONSE	OSR Vessel	1	OSR Equipment	365	489	1	489		0		0	0.8	391.5784503	Diesel
OIL SPILL RESPONSE	OSR Vessel	1	Incinerators 125 lbl/hr - General Refuse		0	1		125		1		1	0	

Figure F- 14. Exploration Drilling Analysis of Potential Vessels' Engines Spreadsheet 2.

OIL SPILL RESPONSE	OSR Workboats	3	Propulsion and Power Generation	1370	1837	1	5512	299	400.9656	1	1202.8968	0.8	5372	Diesel
OIL SPILL RESPONSE	OSR-T/B Barge	1	Propulsion and Power Generation	5373	7205	1	7205	299	400.9656	1	400.9656	0.8	6085	Diesel
OIL SPILL RESPONSE	OSR-T/B Barge	1	OSR Equip.	662	887.76	1	888		0		0	0.8	710.2052989	Diesel
TOTALS		12	Ships			50	Engines							

Assume all engines on a single vessel operate the same number of hours per day, per week, and per season.

Incinerator emissions are based on the lb/hr of general refuse burned, not on fuel consumption.

Anchor handler ships used 33% of the time based on past usage of these ships in the Chukchi Sea OCS Planning Area since 2011.

Ice Breaker Vessels used 26% of the time based on past usage of these ships in the Chukchi Sea OCS Planning Area since 2011.

Propulsion engines on the MODU used .17% of the time based on past usage of this type of ship in the Chukchi Sea OCS Planning Area since 2011.

Figure F- 15. Exploration Drilling Analysis Calculations of Potential Vessels' Engines Spreadsheet 3 and Final.

Exploration
Chukchi Sea
2014LS193 - Scenario

January 22, 2015
Prepared by:
Virginia Raps

Potential Vessels

BOEM

Potential Frequency of Operation and Potential Fuel Comsumed

POTENTIAL VESSEL GROUP	POTENTIAL VESSEL PURPOSE	POTENTIAL ENGINE USE AND PURPOSE	POTENTIAL FREQUENCY OF OPERATON				POTENTIAL TOTAL FUEL CONSUMED (gallons)
			HOURS PER DAY	FREQUENCY	POTENTIAL TOTAL PROJECT HOURS PER PLAN		
			Daily	Weekly	Days per survey	Hours per Ship Type per Survey	
MODU	Exploration Drilling	Propulsion	24 hrs day		120	48	15,665
MODU	Exploration Drilling	Power Generation	24 hrs day		120	2880	1,994,369
MODU	Exploration Drilling	HPU	24 hrs day		120	2880	69,767
MODU	Exploration Drilling	Cranes	24 hrs day		120	2880	130,541
MODU	Exploration Drilling	Cementing Units	24 hrs day		120	2880	72,523
MODU	Exploration Drilling	Logging Unit	24 hrs day		120	2880	32,490
MODU	Exploration Drilling	Compressor	24 hrs day		120	2880	15,085
MODU	Exploration Drilling	Sidewall Core Tool	24 hrs day		120	2880	6,237
MODU	Exploration Drilling	Emerg. Generator	24 hrs day		120	500	28,203
MODU	Exploration Drilling	Rescue and Life Boats	24 hrs day		120	500	42,393
MODU	Exploration Drilling	Boilers	24 hrs day		120	2880	116,533
MODU	Exploration Drilling	Incinerators	24 hrs day		120	2880	-
SUPPORT VESSESLS	Ice Management	Propulsion and Power Generation	24 hrs day		120	760	643,033
SUPPORT VESSESLS	Ice Management	Harbour Set Generator	24 hrs day		120	1850	39,505
SUPPORT VESSESLS	Ice Management	Boilers	24 hrs day		120	2880	36,353
SUPPORT VESSESLS	Ice Management	Incinerators	24 hrs day		120	2880	-
SUPPORT VESSESLS	Ice Management	Emerg. Engines	24 hrs day			500	6,044
SUPPORT VESSESLS	Anchor Handlers	Propulsion and Power Generation	24 hrs day		120	950	1,102,868

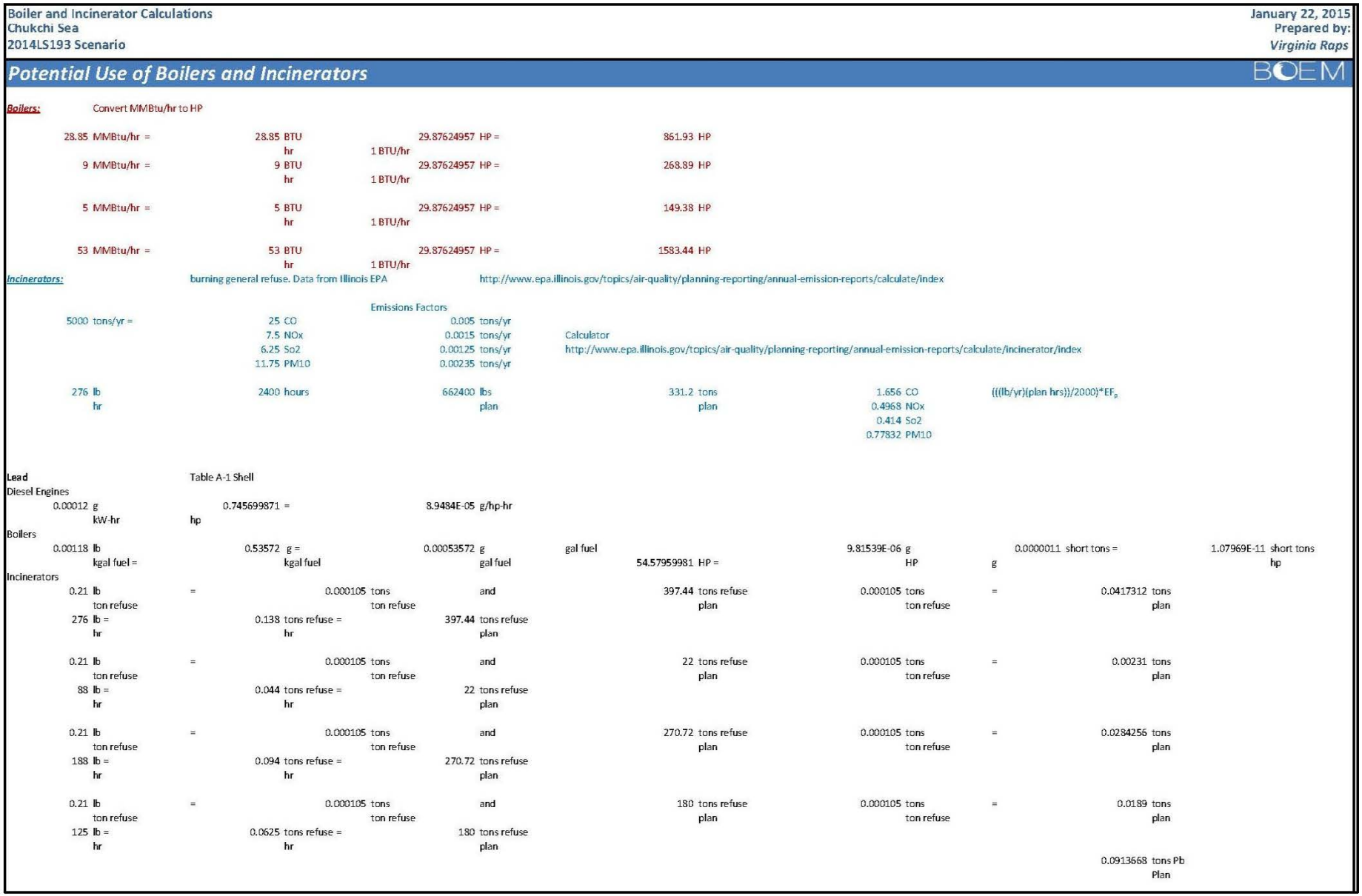
Figure F- 16. Exploration Drilling Analysis Emissions Calculations for Potential Vessels' Engines' Use and Fuel Consumption Spreadsheet 1.

SUPPORT VESSESLS	Anchor Handlers	Ancillary Engines	24	hrs	day			120	2880	362,322
SUPPORT VESSESLS	Anchor Handlers	Emergency Engine	24	hrs	day			120	500	8,058
SUPPORT VESSESLS	Anchor Handlers	OSR Equipment	24	hrs	day			120	960	9,186
SUPPORT VESSESLS	Anchor Handlers	Emerg. Generator	24	hrs	day			120	500	4,281
SUPPORT VESSESLS	Anchor Handlers	Boilers	24	hrs	day			120	2880	20,196
SUPPORT VESSESLS	Anchor Handlers	Incinerators	24	hrs	day			120	2880	-
SUPPORT VESSESLS	Science Vessels	Propulsion and Power Generation	24	hrs	day			120	525	196,321
SUPPORT VESSESLS	Science Vessels	Emerg. Engines	24	hrs	day			120	500	3,148
SUPPORT VESSESLS	Science Vessels	Incinerators	24	hrs	day			120	2880	-
SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	24	hrs	day			120	575	497,162
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Propulsion and Power Generation	24	hrs	day			120	350	338,086
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Emerg. Engines	24	hrs	day			120	500	7,429
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Ancillary Engines	24	hrs	day			120	2880	207,559
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Boilers	24	hrs	day			120	2880	214,081
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Incinerators	24	hrs	day			120	2880	-
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	24	hrs	day			120	700	258,694
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	24	hrs	day	Every	2	120	500	3,148
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	24	hrs	day	Every	2	120	960	38,534
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	24	hrs	day	Every	2	120	960	17,647
OIL SPILL RESPONSE	OSR Vessel	Incinerators	24	hrs	day	Every	2	120	2880	-

Figure F- 17. Exploration Drilling Analysis Emissions Calculations for Potential Vessels' Engines' Use and Fuel Consumption Spreadsheet 2.

OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	24	hrs	day			120	2880	726,240
OIL SPILL RESPONSE	OSR-T/B Barge	Propulsion and Power Generation	24	hrs	day			120	545	155,684
OIL SPILL RESPONSE	OSR-T/B Barge	OSR Equip.	24	hrs	day	Every	2	120	960	32,007
									71,743	7,451,390

Figure F- 18. Exploration Drilling Analysis Emissions Calculations for Potential Vessels' Engines' Use and Fuel Consumption Spreadsheet 3 and Final.



Boiler and Incinerator Calculations
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Potential Use of Boilers and Incinerators

BOEM

Boilers: Convert MMBtu/hr to HP

28.85	MMBtu/hr =	28.85	BTU/hr	1 BTU/hr	29.87624957	HP =	861.93	HP
9	MMBtu/hr =	9	BTU/hr	1 BTU/hr	29.87624957	HP =	268.89	HP
5	MMBtu/hr =	5	BTU/hr	1 BTU/hr	29.87624957	HP =	149.38	HP
53	MMBtu/hr =	53	BTU/hr	1 BTU/hr	29.87624957	HP =	1583.44	HP

Incinerators: burning general refuse. Data from Illinois EPA http://www.epa.illinois.gov/topics/air-quality/planning-reporting/annual-emission-reports/calculate/index

Emissions Factors

5000	tons/yr =	25	CO	0.005	tons/yr						
		7.5	NOx	0.0015	tons/yr	Calculator					
		6.25	So2	0.00125	tons/yr	http://www.epa.illinois.gov/topics/air-quality/planning-reporting/annual-emission-reports/calculate/incinerator/index					
		11.75	PM10	0.00235	tons/yr						
276	lb/hr	2400	hours	662400	lbs/plan		331.2	tons/plan	1.656	CO	$\{\{(lb/yr)(plan\ hrs)\}/2000\}*EF_p$
									0.4968	NOx	
									0.414	So2	
									0.77832	PM10	

Lead Table A-1 Shell

Diesel Engines

0.00012	g/kW-hr	0.745699871	hp	=	8.9484E-05	g/hp-hr							

Boilers

0.00118	lb/kgal fuel =	0.53572	g/kgal fuel	=	0.00053572	g/gal fuel	gal fuel	54.57959981	HP =	9.81539E-06	g/HP	0.0000011	short tons =	1.07969E-11	short tons/hp

Incinerators

0.21	lb/ton refuse	=	0.000105	tons/ton refuse	and	397.44	tons refuse/plan	0.000105	tons/ton refuse	=	0.0417312	tons/plan	
276	lb/hr =	0.138	tons refuse/hr =		397.44	tons refuse/plan							
0.21	lb/ton refuse	=	0.000105	tons/ton refuse	and	22	tons refuse/plan	0.000105	tons/ton refuse	=	0.00231	tons/plan	
88	lb/hr =	0.044	tons refuse/hr =		22	tons refuse/plan							
0.21	lb/ton refuse	=	0.000105	tons/ton refuse	and	270.72	tons refuse/plan	0.000105	tons/ton refuse	=	0.0284256	tons/plan	
188	lb/hr =	0.094	tons refuse/hr =		270.72	tons refuse/plan							
0.21	lb/ton refuse	=	0.000105	tons/ton refuse	and	180	tons refuse/plan	0.000105	tons/ton refuse	=	0.0189	tons/plan	
125	lb/hr =	0.0625	tons refuse/hr =		180	tons refuse/plan							
											0.0913668	tons Pb/Plan	

Figure F- 19. Exploration Drilling Analysis Calculations for Boilers and Incinerators.

Exploration
Chukchi Sea
2014LS193 - Scenario

January 22, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Total Fuel Consumption and Total HP

POTENTIAL VESSEL GROUP	POTENTIAL VESSEL PURPOSE	POTENTIAL ENGINES USES AND PURPOSE	ASSIGNMENT OF EMISSION FACTORS		POTENTIAL INCINERATORS (lb of refuse burned/hr)	POTENTIAL FUEL CONSUMED	
			Total HP	HP Range for Emission Factors		Total Hours per Engine(s)	Total Fuel Consumed (gallons)
MODU	Exploration Drilling	Propulsion	6952	>=600 HP		48	15,665
MODU	Exploration Drilling	Power Generation	14751	>=600 HP		2880	1,994,369
MODU	Exploration Drilling	HPU	516	<600 HP		2880	69,767
MODU	Exploration Drilling	Cranes	966	>=600 HP		2880	130,541
MODU	Exploration Drilling	Cementing Units	536	<600 HP		2880	72,523
MODU	Exploration Drilling	Logging Unit	240	<600 HP		2880	32,490
MODU	Exploration Drilling	Compressor	112	<600 HP		2880	15,085
MODU	Exploration Drilling	Sidewall Core Tool	46	<600 HP		2880	6,237
MODU	Exploration Drilling	Emerg. Generator	1202	>=600 HP		500	28,203
MODU	Exploration Drilling	Rescue and Life Boats	1806	<600 HP		500	42,393
MODU	Exploration Drilling	Boilers	862	>=600 HP		2880	116,533
MODU	Exploration Drilling	Incinerators	0	<600 HP	276	2880	-
SUPPORT VESSESLS	Ice Management	Propulsion and Power Generation	18023	>=600 HP		760	643,033
SUPPORT VESSESLS	Ice Management	Harbour Set Generator	455	<600 HP		1850	39,505
SUPPORT VESSESLS	Ice Management	Boilers	269	<600 HP		2880	36,353
SUPPORT VESSESLS	Ice Management	Incinerators	0	<600 HP	154	2880	-
SUPPORT VESSESLS	Ice Management	Emerg. Engines	257	<600 HP		500	6,044

Figure F- 20. Exploration Drilling Analysis Identification of Emissions Factors Spreadsheet 1.

SUPPORT VESSESLS	Anchor Handlers	Propulsion and Power Generation	24730	>=600 HP		950	1,102,868
SUPPORT VESSESLS	Anchor Handlers	Ancillary Engines	2680	>=600 HP		2880	362,322
SUPPORT VESSESLS	Anchor Handlers	Emergency Engine	343	<600 HP		500	8,058
SUPPORT VESSESLS	Anchor Handlers	OSR Equipment	204	<600 HP		960	9,186
SUPPORT VESSESLS	Anchor Handlers	Emerg. Generator	182	<600 HP		500	4,281
SUPPORT VESSESLS	Anchor Handlers	Boilers	149	<600 HP		2880	20,196
SUPPORT VESSESLS	Anchor Handlers	Incinerators	0	<600 HP	276	2880	-
SUPPORT VESSESLS	Science Vessels	Propulsion and Power Generation	31863	>=600 HP		525	196,321
SUPPORT VESSESLS	Science Vessels	Emerg. Engines	536	<600 HP		500	3,148
SUPPORT VESSESLS	Science Vessels	Incinerators	0	<600 HP	88	2880	-
SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	18418	>=600 HP		575	497,162
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Propulsion and Power Generation	20577	>=600 HP		350	338,086
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Emerg. Engines	316	<600 HP		500	7,429
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Ancillary Engines	1535	>=600 HP		2880	207,559
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Boilers	1583	>=600 HP		2880	214,081
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Incinerators	0	<600 HP	188	2880	-
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	7872	>=600 HP		700	258,694
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	134	<600 HP		500	3,148
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	855	>=600 HP		960	38,534
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	392	<600 HP		960	17,647
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0	<600 HP	125	2880	-

Figure F- 21. Exploration Drilling Analysis Identification of Emissions Factors Spreadsheet 2.

OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	5372	>=600 HP		2880	726,240
OIL SPILL RESPONSE	OSR-T/B Barge	Propulsion and Power Generation	6085	>=600 HP		545	155,684
OIL SPILL RESPONSE	OSR-T/B Barge	OSR Equip.	710	<600 HP		960	32,007
TOTALS			171530				7451390

Figure F- 22. Exploration Drilling Analysis Identification of Emissions Factors Spreadsheet 3 and Final.

Exploration
Chukchi Sea
2014LS193 - Scenario

January 22, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Emission Factors

Potential Vessel Group	Potential Vessel Purpose	Potential Engine Use or Purpose	Emission Factors (g/hp-hr, except g/gallon of fuel for GHGs)									
			$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2
MODU	Exploration Drilling	Propulsion	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	HPU	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Cranes	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Cementing Units	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Logging Unit	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Compressor	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Sidewall Core Tool	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Emerg. Generator	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Rescue and Life Boats	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Boilers	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Incinerators	0.00235	0.00125	0.0015	0.0000	0.005	0	0	0	0	0
SUPPORT VESSESLS	Ice Management	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Ice Management	Harbour Set Generator	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Ice Management	Boilers	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Ice Management	Incinerators	0.00235	0.00125	0.0015	0.0000	0.005	0	0	0	0	0
SUPPORT VESSESLS	Ice Management	Emerg. Engines	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82

Figure F- 23. Exploration Drilling Analysis Emissions Factors Spreadsheet 1.

SUPPORT VESSESLS	Anchor Handlers	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Anchor Handlers	Ancillary Engines	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Anchor Handlers	Emergency Engine	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Anchor Handlers	OSR Equipment	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Anchor Handlers	Emerg. Generator	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Anchor Handlers	Boilers	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Anchor Handlers	Incinerators	0.00235	0.00125	0.0015	0.0000	0.005	0	0	0	0	0
SUPPORT VESSESLS	Science Vessels	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Science Vessels	Emerg. Engines	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Science Vessels	Incinerators	0.00235	0.00125	0.0015	0.0000	0.005	0	0	0	0	0
SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Emerg. Engines	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Ancillary Engines	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Boilers	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Incinerators	0.00235	0.00125	0.0015	0.0000	0.005	0	0	0	0	0
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0.00235	0.00125	0.0015	0.0000	0.005	0	0	0	0	0

Figure F- 24. Exploration Drilling Analysis Emissions Factors Spreadsheet 2.

OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR-T/B Barge	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR-T/B Barge	OSR Equip.	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82

Figure F- 25. Exploration Drilling Analysis Emissions Factors Spreadsheet 3 and Final.

Exploration
Chukchi Sea
2014LS193 - Scenario

January 22, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Application of Emission Factors, Conversion to grams per Engine

Potential Vessel Group	Potential Vessel Purpose	Potential Engine Use or Purpose	POTENTIAL PROJECTED EMISSIONS (grams per engine)									
			$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2
MODU	Exploration Drilling	Propulsion	1.E+05	1.E+04	3.E+06	1.E+05	8.E+05	3.E+01	2.33E+04	6.23E+05	4.34E+04	2.E+08
MODU	Exploration Drilling	Power Generation	1.E+07	1.E+06	3.E+08	1.E+07	1.E+08	4.E+03	2.97E+06	7.94E+07	5.53E+06	2.E+10
MODU	Exploration Drilling	HPU	1.E+06	5.E+04	2.E+07	2.E+06	5.E+06	1.E+02	1.04E+05	2.78E+06	1.94E+05	8.E+08
MODU	Exploration Drilling	Cranes	9.E+05	9.E+04	3.E+07	9.E+05	7.E+06	2.E+02	1.94E+05	5.19E+06	3.62E+05	1.E+09
MODU	Exploration Drilling	Cementing Units	2.E+06	5.E+04	2.E+07	2.E+06	5.E+06	1.E+02	1.08E+05	2.89E+06	2.01E+05	8.E+08
MODU	Exploration Drilling	Logging Unit	7.E+05	2.E+04	1.E+07	8.E+05	2.E+06	6.E+01	4.84E+04	1.29E+06	9.01E+04	4.E+08
MODU	Exploration Drilling	Compressor	3.E+05	1.E+04	4.E+06	4.E+05	1.E+06	3.E+01	2.25E+04	6.00E+05	4.18E+04	2.E+08
MODU	Exploration Drilling	Sidewall Core Tool	1.E+05	4.E+03	2.E+06	1.E+05	4.E+05	1.E+01	9.29E+03	2.48E+05	1.73E+04	7.E+07
MODU	Exploration Drilling	Emerg. Generator	2.E+05	2.E+04	7.E+06	2.E+05	1.E+06	5.E+01	4.20E+04	1.12E+06	7.82E+04	3.E+08
MODU	Exploration Drilling	Rescue and Life Boats	9.E+05	3.E+04	1.E+07	1.E+06	3.E+06	8.E+01	6.31E+04	1.69E+06	1.18E+05	5.E+08
MODU	Exploration Drilling	Boilers	8.E+05	8.E+04	3.E+07	8.E+05	6.E+06	2.E+02	1.74E+05	4.64E+06	3.23E+05	1.E+09
MODU	Exploration Drilling	Incinerators	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.00E+00	0.00E+00	0.00E+00	0.E+00
SUPPORT VESSESLS	Ice Management	Propulsion and Power Generation	4.E+06	5.E+05	1.E+08	5.E+06	3.E+07	1.E+03	9.58E+05	2.56E+07	1.78E+06	7.E+09
SUPPORT VESSESLS	Ice Management	Harbour Set Generator	8.E+05	3.E+04	1.E+07	9.E+05	3.E+06	8.E+01	5.88E+04	1.57E+06	1.10E+05	5.E+08
SUPPORT VESSESLS	Ice Management	Boilers	8.E+05	3.E+04	1.E+07	9.E+05	2.E+06	7.E+01	5.41E+04	1.45E+06	1.01E+05	4.E+08
SUPPORT VESSESLS	Ice Management	Incinerators	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.00E+00	0.00E+00	0.00E+00	0.E+00
SUPPORT VESSESLS	Ice Management	Emerg. Engines	1.E+05	4.E+03	2.E+06	1.E+05	4.E+05	1.E+01	9.00E+03	2.41E+05	1.68E+04	7.E+07

Figure F- 26. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 1.

SUPPORT VESSESLS	Anchor Handlers	Propulsion and Power Generation	8.E+06	8.E+05	2.E+08	8.E+06	6.E+07	2.E+03	1.64E+06	4.39E+07	3.06E+06	1.E+10
SUPPORT VESSESLS	Anchor Handlers	Ancillary Engines	2.E+06	3.E+05	8.E+07	3.E+06	2.E+07	7.E+02	5.40E+05	1.44E+07	1.00E+06	4.E+09
SUPPORT VESSESLS	Anchor Handlers	Emergency Engine	2.E+05	6.E+03	2.E+06	2.E+05	5.E+05	2.E+01	1.20E+04	3.21E+05	2.23E+04	9.E+07
SUPPORT VESSESLS	Anchor Handlers	OSR Equipment	2.E+05	6.E+03	3.E+06	2.E+05	6.E+05	2.E+01	5.40E+05	1.44E+07	1.00E+06	4.E+09
SUPPORT VESSESLS	Anchor Handlers	Emerg. Generator	9.E+04	3.E+03	1.E+06	1.E+05	3.E+05	8.E+00	1.20E+04	3.21E+05	2.23E+04	9.E+07
SUPPORT VESSESLS	Anchor Handlers	Boilers	4.E+05	1.E+04	6.E+06	5.E+05	1.E+06	4.E+01	1.37E+04	3.66E+05	2.55E+04	1.E+08
SUPPORT VESSESLS	Anchor Handlers	Incinerators	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.00E+00	0.00E+00	0.00E+00	0.E+00
SUPPORT VESSESLS	Science Vessels	Propulsion and Power Generation	5.E+06	6.E+05	1.E+08	6.E+06	4.E+07	1.E+03	1.17E+06	3.13E+07	2.18E+06	9.E+09
SUPPORT VESSESLS	Science Vessels	Emerg. Engines	3.E+05	9.E+03	4.E+06	3.E+05	8.E+05	2.E+01	1.88E+04	5.01E+05	3.49E+04	1.E+08
SUPPORT VESSESLS	Science Vessels	Incinerators										
SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	3.E+06	3.E+05	8.E+07	3.E+06	3.E+07	9.E+02	4.69E+03	1.25E+05	8.73E+03	4.E+07
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Propulsion and Power Generation	2.E+06	2.E+05	6.E+07	2.E+06	2.E+07	6.E+02	0.00E+00	0.00E+00	0.00E+00	0.E+00
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Emerg. Engines	2.E+05	5.E+03	2.E+06	2.E+05	5.E+05	1.E+01	7.41E+05	1.98E+07	1.38E+06	6.E+09
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Ancillary Engines	1.E+06	1.E+05	5.E+07	1.E+06	1.E+07	4.E+02	5.04E+05	1.35E+07	9.38E+05	4.E+09
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Boilers	1.E+06	2.E+05	5.E+07	2.E+06	1.E+07	4.E+02	1.11E+04	2.96E+05	2.06E+04	9.E+07
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Incinerators	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.00E+00	0.00E+00	0.00E+00	0.E+00
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	2.E+06	2.E+05	4.E+07	2.E+06	1.E+07	5.E+02	3.19E+05	8.52E+06	5.94E+05	2.E+09
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	7.E+04	2.E+03	9.E+05	8.E+04	2.E+05	6.E+00	0.00E+00	0.00E+00	0.00E+00	0.E+00
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	3.E+05	3.E+04	9.E+06	3.E+05	2.E+06	7.E+01	3.85E+05	1.03E+07	7.18E+05	3.E+09
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	4.E+05	1.E+04	5.E+06	4.E+05	1.E+06	3.E+01	4.69E+03	1.25E+05	8.73E+03	4.E+07
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.00E+00	0.00E+00	0.00E+00	0.E+00

Figure F- 27. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 2.

OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	5.E+06	5.E+05	1.E+08	5.E+06	4.E+07	1.E+03	1.08E+06	2.89E+07	2.01E+06	8.E+09
OIL SPILL RESPONSE	OSR-T/B Barge	Propulsion and Power Generation	1.E+06	1.E+05	3.E+07	1.E+06	8.E+06	3.E+02	2.32E+05	6.20E+06	4.32E+05	2.E+09
OIL SPILL RESPONSE	OSR-T/B Barge	OSR Equip.	7.E+05	2.E+04	1.E+07	8.E+05	2.E+06	6.E+01	1.08E+06	2.89E+07	2.01E+06	8.E+09

Figure F- 28. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 3.

Exploration
Chukchi Sea
2014LS193 - Scenario

January 22, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Convert from grams to pounds per Engine

Potential Vessel Group	Potential Vessel Purpose	Potential Engine Use or Purpose	POTENTIAL PROJECTED EMISSIONS (lbs per engine)									
			$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2
MODU	Exploration Drilling	Propulsion	235	24	5773	243	1766	0.066	51	1374	96	395559
MODU	Exploration Drilling	Power Generation	29971	3091	735014	30908	224785	8.381	6549	174975	12195	50360529
MODU	Exploration Drilling	HPU	3276	108	45870	3670	9928	0.293	229	6121	427	1761703
MODU	Exploration Drilling	Cranes	1962	202	67435	2023	14713	0.549	429	11453	798	3296326
MODU	Exploration Drilling	Cementing Units	3406	112	47682	3815	10320	0.305	238	6363	443	1831292
MODU	Exploration Drilling	Logging Unit	1526	50	21361	1709	4623	0.137	107	2850	199	820419
MODU	Exploration Drilling	Compressor	708	23	9918	793	2146	0.063	50	1323	92	380909
MODU	Exploration Drilling	Sidewall Core Tool	293	10	4101	328	887	0.026	20	547	38	157491
MODU	Exploration Drilling	Emerg. Generator	424	44	14569	437	3179	0.119	93	2474	172	712169
MODU	Exploration Drilling	Rescue and Life Boats	1991	66	27872	2230	6032	0.178	139	3719	259	1070479
MODU	Exploration Drilling	Boilers	1751	181	60199	1806	13134	0.490	383	10224	713	2942616
MODU	Exploration Drilling	Incinerators	0	0	0	0	0	0.000	0	0	0	0
SUPPORT VESSESLS	Ice Management	Propulsion and Power Generation	9663	997	236986	9965	72476	2.702	2112	56416	3932	16237455
SUPPORT VESSESLS	Ice Management	Harbour Set Generator	1855	61	25973	2078	5621	0.166	130	3466	242	997545
SUPPORT VESSESLS	Ice Management	Boilers	1707	56	23901	1912	5173	0.153	119	3189	222	917974
SUPPORT VESSESLS	Ice Management	Incinerators	0	0	0	0	0	0	0	0	0	0
SUPPORT VESSESLS	Ice Management	Emerg. Engines	284	9	3973	318	860	0.025	20	530	37	152608

Figure F- 29. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 4.

SUPPORT VESSESLS	Anchor Handlers	Propulsion and Power Generation	16574	1709	406456	17092	124304	4.635	3622	96759	6744	27848927
SUPPORT VESSESLS	Anchor Handlers	Ancillary Engines	5445	562	187171	5615	40837	1.523	1190	31788	2215	9149135
SUPPORT VESSESLS	Anchor Handlers	Emergency Engine	378	12	5298	424	1147	0.034	26	707	49	203477
SUPPORT VESSESLS	Anchor Handlers	OSR Equipment	431	14	6040	483	1307	0.039	1190	31788	2215	9149135
SUPPORT VESSESLS	Anchor Handlers	Emerg. Generator	201	7	2815	225	609	0.018	26	707	49	203477
SUPPORT VESSESLS	Anchor Handlers	Boilers	948	31	13279	1062	2874	0.085	30	806	56	231964
SUPPORT VESSESLS	Anchor Handlers	Incinerators	0	0	0	0	0	0.000	0	0	0	0
SUPPORT VESSESLS	Science Vessels	Propulsion and Power Generation	11801	1217	289412	12170	88509	3.300	2579	68896	4802	19829458
SUPPORT VESSESLS	Science Vessels	Emerg. Engines	591	20	8278	662	1792	0.053	41	1105	77	317933
SUPPORT VESSESLS	Science Vessels	Incinerators	0	0	0	0	0	0	0	0	0	0
SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	7471	770	183226	7705	56035	2.089	10	276	19	79483
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Propulsion and Power Generation	5081	524	124600	5240	38106	1.421	0	0	0	0
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Emerg. Engines	349	12	4884	391	1057	0.031	1633	43618	3040	12554015
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Ancillary Engines	3119	322	107222	3217	23394	0.872	1110	29662	2067	8537127
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Boilers	3217	332	110591	3318	24129	0.900	24	652	45	187580
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Incinerators	0	0	0	0	0	0	0	0	0	0
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	3888	401	95340	4009	29157	1.087	703	18782	1309	5405845
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	148	5	2070	166	448	0.013	0	0	0	0
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	579	60	19906	597	4343	0.162	850	22696	1582	6532371
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	829	27	11603	928	2511	0.074	10	276	19	79483
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0	0	0	0	0	0.000	0	0	0	0

Figure F- 30. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 5.

OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	10914	1125	267652	11255	81854	3.052	2385	63716	4441	18338558
OIL SPILL RESPONSE	OSR-T/B Barge	Propulsion and Power Generation	2340	241	57376	2413	17547	0.654	511	13659	952	3931224
OIL SPILL RESPONSE	OSR-T/B Barge	OSR Equip.	1503	50	21043	1683	4554	0.135	2385	63716	4441	18338558

Figure F- 31. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 6.

Exploration
Chukchi Sea
2014LS193 - Scenario

January 22, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Convert from lbs to short tons per Engine, except metric tons for GHGs

Potential Vessel Group	Vessel Purpose	Potential Engine Use or Purpose	POTENTIAL PROJECTED EMISSIONS (tons per engine)										
			$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
MODU	Exploration Drilling	Propulsion	0.12	0.01	2.89	0.12	0.88	0.000	0.03	0.69	0.05	198	199
MODU	Exploration Drilling	Power Generation	14.99	1.55	367.51	15.45	112.39	0.004	3.27	87.49	6.10	25180	25274
MODU	Exploration Drilling	HPU	1.64	0.05	22.93	1.83	4.96	0.000	0.11	3.06	0.21	881	884
MODU	Exploration Drilling	Cranes	0.98	0.10	33.72	1.01	7.36	0.000	0.21	5.73	0.40	1648	1654
MODU	Exploration Drilling	Cementing Units	1.70	0.06	23.84	1.91	5.16	0.000	0.12	3.18	0.22	916	919
MODU	Exploration Drilling	Logging Unit	0.76	0.03	10.68	0.85	2.31	0.000	0.05	1.43	0.10	410	412
MODU	Exploration Drilling	Compressor	0.35	0.01	4.96	0.40	1.07	0.000	0.02	0.66	0.05	190	191
MODU	Exploration Drilling	Sidewall Core Tool	0.15	0.00	2.05	0.16	0.44	0.000	0.01	0.27	0.02	79	79
MODU	Exploration Drilling	Emerg. Generator	0.21	0.02	7.28	0.22	1.59	0.000	0.05	1.24	0.09	356	357
MODU	Exploration Drilling	Rescue and Life Boats	1.00	0.03	13.94	1.11	3.02	0.000	0.07	1.86	0.13	535	537
MODU	Exploration Drilling	Boilers	0.88	0.09	30.10	0.90	6.57	0.000	0.19	5.11	0.36	1471	1477
MODU	Exploration Drilling	Incinerators	0.93	0.50	0.60	0.000	1.99	0.0000	0.00	0.00	0.00	0.00	0.00
SUPPORT VESSESLS	Ice Management	Propulsion and Power Generation	4.83	0.50	118.49	4.98	36.24	0.001	1.06	28.21	1.97	8119	8149
SUPPORT VESSESLS	Ice Management	Harbour Set Generator	0.93	0.03	12.99	1.04	2.81	0.000	0.06	1.73	0.12	499	501
SUPPORT VESSESLS	Ice Management	Boilers	0.85	0.03	11.95	0.96	2.59	0.000	0.06	1.59	0.11	459	461
SUPPORT VESSESLS	Ice Management	Incinerators	0.52	0.28	0.33	0.00	1.11	0.00	0.00	0.00	0.00	0.00	0.00
SUPPORT VESSESLS	Ice Management	Emerg. Engines	0.14	0.00	1.99	0.16	0.43	0.000	0.01	0.27	0.02	76	77

Figure F- 32. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 7.

SUPPORT VESSESLS	Anchor Handlers	Propulsion and Power Generation	8.29	0.85	203.23	8.55	62.15	0.002	1.81	48.38	3.37	13924	13976
SUPPORT VESSESLS	Anchor Handlers	Ancillary Engines	2.72	0.28	93.59	2.81	20.42	0.001	0.59	15.89	1.11	4575	4592
SUPPORT VESSESLS	Anchor Handlers	Emergency Engine	0.19	0.01	2.65	0.21	0.57	0.000	0.01	0.35	0.02	102	102
SUPPORT VESSESLS	Anchor Handlers	OSR Equipment	0.22	0.01	3.02	0.24	0.65	0.000	0.59	15.89	1.11	4575	4592
SUPPORT VESSESLS	Anchor Handlers	Emerg. Generator	0.10	0.00	1.41	0.11	0.30	0.000	0.01	0.35	0.02	102	102
SUPPORT VESSESLS	Anchor Handlers	Boilers	0.47	0.02	6.64	0.53	1.44	0.000	0.02	0.40	0.03	116	116
SUPPORT VESSESLS	Anchor Handlers	Incinerators	0.93	0.50	0.60	0.00	1.99	0.00	0.00	0.00	0.00	0.00	0.00
SUPPORT VESSESLS	Science Vessels	Propulsion and Power Generation	5.90	0.61	144.71	6.08	44.25	0.002	1.29	34.45	2.40	9915	9952
SUPPORT VESSESLS	Science Vessels	Emerg. Engines	0.30	0.01	4.14	0.33	0.90	0.000	0.02	0.55	0.04	159	160
SUPPORT VESSESLS	Science Vessels	Incinerators	0.30	0.16	0.19	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00
SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	3.74	0.39	91.61	3.85	28.02	0.001	0.01	0.14	0.01	40	40
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Propulsion and Power Generation	2.54	0.26	62.30	2.62	19.05	0.001	0.00	0.00	0.00	0	0
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Emerg. Engines	0.17	0.01	2.44	0.20	0.53	0.000	0.82	21.81	1.52	6277	6300
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Ancillary Engines	1.56	0.16	53.61	1.61	11.70	0.000	0.56	14.83	1.03	4269	4284
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Boilers	1.61	0.17	55.30	1.66	12.06	0.000	0.01	0.33	0.02	94	94
SUPPORT VESSESLS	Arctic Oil Storage Tanker	Incinerators	0.64	0.34	0.41	0.00	1.35	0.00	0.00	0.00	0.00	0.00	0.00
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	1.94	0.20	47.67	2.00	14.58	0.001	0.35	9.39	0.65	2703	2713
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	0.07	0.00	1.03	0.08	0.22	0.000	0.00	0.00	0.00	0	0
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	0.29	0.03	9.95	0.30	2.17	0.000	0.42	11.35	0.79	3266	3278
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	0.41	0.01	5.80	0.46	1.26	0.000	0.01	0.14	0.01	40	40
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0.42	0.23	0.27	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00

Figure F- 33. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 8.

OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	5.46	0.56	133.83	5.63	40.93	0.002	1.19	31.86	2.22	9169	9203
OIL SPILL RESPONSE	OSR-T/B Barge	Propulsion and Power Generation	1.17	0.12	28.69	1.21	8.77	0.000	0.26	6.83	0.48	1966	1973
OIL SPILL RESPONSE	OSR-T/B Barge	OSR Equip.	0.75	0.02	10.52	0.84	2.28	0.000	1.19	31.86	2.22	9169	9203
		TOTAL	71.18	8.23	1,629.84	70.44	468.05	0.02	14.50	387.32	26.99	111,476	111,891
			POTENTIAL PROJECTED EMISSIONS FROM EXPLORATION DRILLING AND WELL DELINEATION										
			$PM_{10\&2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}

Figure F- 34. Exploration Drilling Analysis Emissions Calculations for Potential Vessels Spreadsheet 9 and Final.

F-4. Decommissioning

Example Scenario Activity - Decommissioning			BOEM
TODAY'S DATE	January 23, 2015	Version:	New
TITLE OF THE SURVEY	2014LS193 - Decommissioning		
SURVEY COMPANY NAME	BOEM		
COMPANY LOCATION	Anchorage, AK		
PLAN TYPE	Decommissioning		
PLAN DATE			
LOCATION	Chukchi Sea		
TOWNSHIP AND RANGE	Principal Meridian		
DATE(S) OF OPERATION			
NUMBER OF DAYS EACH YEAR	15 days		
MINIMUM OPERATING DISTANCE FROM SHORE	60.8 statute miles		
BOEM PREPARER CONTACT INFORMATION:			
NAME	Virginia Raps		
TITLE	Meteorologist		
TELEPHONE NUMBER	907-334-5256		
EMAIL	virginia.raps@boem.gov		
REMARKS			

Figure F- 35. Decommissioning Analysis Cover Sheet.

Decommissioning
Chukchi Sea
2014LS193 - Decommissioning

January 23, 2015
Prepared by:
Virginia Raps

Proposed Vessels

BOEM

Vessel Engine Characteristics

Vessel Group	Vessel Purpose	Nbr of Ships	Engine Use or Purpose	ENGINES											TOTAL HP	Fuel Type
				MAIN PROPULSION AND ANCILLARY ENGINES					INCINERATORS AND AUXILIARY/POWER GENERATION ENGINES							
				Make/Model	kW	HP	Nbr Eng.	Total HP	Make/Model	kW	HP	Nbr Eng.	Total HP	Control		
MODU	Exploration Drilling	1	Propulsion	STX-MAN 6S42MC7	6480	8690	1	8690		0	0		0	0.8	6952	Diesel
MODU	Exploration Drilling	1	Power Generation	Bergen/KVG-18	13750	18439	1	18439		0	0		0	0.8	14751	Diesel
MODU	Exploration Drilling	1	HPU	MERCEDES/ OM926LA	241	323	2	645			0		0	0.8	516	Diesel
MODU	Exploration Drilling	1	Cranes	LIEBHERR D9508HF485	450	603	2	1207			0		0	0.8	966	Diesel
MODU	Exploration Drilling	1	Cementing Units	DETROIT 8V-71N	250	335	2	671			0		0	0.8	536	Diesel
MODU	Exploration Drilling	1	Logging Unit	CATERPILLAR CU ACERT	224	300	1	300			0		0	0.8	240	Diesel
MODU	Exploration Drilling	1	Compressor	DETROIT 4-71	104	139	1	139			0		0	0.8	112	Diesel
MODU	Exploration Drilling	1	Sidewall Core Tool	JOHN DEERE 4024TF270	43	58	1	58			0		0	0.8	46	Diesel
MODU	Exploration Drilling	1	Emerg. Generator	TEJOS/MTU 12-396	1120	1502	1	1502			0		0	0.8	1202	Diesel
MODU	Exploration Drilling	1	Rescue and Life Boats	MERCEDES/ OM926LA (or similar)	240.5	323	7	2258			0		0	0.8	1806	Diesel
MODU	Exploration Drilling	1	Boilers	AALBORG INDUSTRIES 28.85 MMBtu/hr		862	1	862			0		0	1	862	Diesel
MODU	Exploration Drilling	1	Incinerators	276 lb/hr - General Refuse		0	1		276			1		1	0	
SUPPORT VESSESLS	Support Tugs	1	Propulsion and Power Generation		8119	10888	1	10888		465	623.57527	1	623.57527	0.8	9209	Diesel

Figure F- 36. Decommissioning Analysis of Potential Vessels' Engines Spreadsheet 1. *Note: The vessel groups shown in red font denote separate categories of vessels used for decommissioning.*

OIL SPILL RESPONSE	OSR Vessel	1	Propulsion and Power Generation		5420	7268	1	7268		1918	2572.0804	1	2572.0804	0.8	7872	Diesel
OIL SPILL RESPONSE	OSR Vessel	1	Emerg. Engines		125	168	1	168			0		0	0.8	134.102209	Diesel
OIL SPILL RESPONSE	OSR Vessel	1	Ancillary Engines		797	1069	1	1069			0		0	0.8	855.0356846	Diesel
OIL SPILL RESPONSE	OSR Vessel	1	OSR Equipment		365	489	1	489			0		0	0.8	391.5784503	Diesel
OIL SPILL RESPONSE	OSR Vessel	1	Incinerators	125 lbl/hr - General Refuse		0	1		125			1		1	0	
OIL SPILL RESPONSE	OSR Workboats	3	Propulsion and Power Generation		1370	1837	1	5512		299	400.9656	1	1202.8968	0.8	5372	Diesel
TOTALS		5					28	60164							51,822	
Assume all engines on a single vessel operate the same number of hours per day, per week, and per season.																

Figure F- 37. Decommissioning Analysis of Potential Vessels' Engines Spreadsheet 2 and Final.

Decommissioning
Chukchi Sea
2014LS193 - Decommissioning

January 23, 2015
Prepared by
Virginia Raps

Proposed Vessels

BOEM

Vessel Operations

Vessel Group	Vessel Purpose	Engine Use or Purpose	FREQUENCY OF OPERATON							Total Fuel Consumption by Vessel Type (gallons)
			HOURS PER DAY			FREQUENCY		TOTAL PROJECT HOURS PER PLAN		
			Daily			Weekly		Days per survey	Hours per Ship Type per Survey	
MODU	Exploration Drilling	Propulsion	24	hrs	day			15	24	7,832
MODU	Exploration Drilling	Power Generation	24	hrs	day			15	360	249,296
MODU	Exploration Drilling	HPU	24	hrs	day			15	360	8,721
MODU	Exploration Drilling	Cranes	24	hrs	day			15	360	16,318
MODU	Exploration Drilling	Cementing Units	24	hrs	day			15	360	9,065
MODU	Exploration Drilling	Logging Unit	24	hrs	day			15	360	4,061
MODU	Exploration Drilling	Compressor	24	hrs	day			15	360	1,886
MODU	Exploration Drilling	Sidewall Core Tool	24	hrs	day			15	360	780
MODU	Exploration Drilling	Emerg. Generator	24	hrs	day			15	500	28,203
MODU	Exploration Drilling	Rescue and Life Boats	24	hrs	day			15	500	42,393
MODU	Exploration Drilling	Boilers	24	hrs	day			15	360	14,567
MODU	Exploration Drilling	Incinerators	24	hrs	day			15	360	-
SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	#REF!	hrs	day			15	575	248,581

Figure F- 38. Decommissioning Analysis Emissions Calculations for Potential Vessels' Engines' Use and Fuel Consumption Spreadsheet 1.

OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	24	hrs	day			15	360	133,043
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	24	hrs	day	Every	2	15	360	2,266
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	24	hrs	day	Every	2	15	360	14,450
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	24	hrs	day	Every	2	15	360	6,618
OIL SPILL RESPONSE	OSR Vessel	Incinerators	24	hrs	day	Every	2	15	360	-
OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	24	hrs	day			15	360	90,780
TOTALS									6,999	878,859

Figure F- 39. Decommissioning Analysis Emissions Calculations for Potential Vessels' Engines' Use and Fuel Consumption Spreadsheet 2 and Final.

Decommissioning
Chukchi Sea
2014LS193 - Decommissioning

January 23, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Total Fuel Consumption and Total HP

Vessel Group	Vessel Purpose	Engine Use or Purpose	ASSIGNMENT OF EMISSION FACTORS		Incinerators (lb of refuse burned/hr)	Fuel Consumed	
			Total HP	HP Range for Emission Factors		Total Hours per Engine(s)	Total Fuel Consumed (gallons)
MODU	Exploration Drilling	Propulsion	6952	>=600 HP		24	7,832
MODU	Exploration Drilling	Power Generation	14751	>=600 HP		360	249,296
MODU	Exploration Drilling	HPU	516	<600 HP		360	8,721
MODU	Exploration Drilling	Cranes	966	>=600 HP		360	16,318
MODU	Exploration Drilling	Cementing Units	536	<600 HP		360	9,065
MODU	Exploration Drilling	Logging Unit	240	<600 HP		360	4,061
MODU	Exploration Drilling	Compressor	112	<600 HP		360	1,886
MODU	Exploration Drilling	Sidewall Core Tool	46	<600 HP		360	780
MODU	Exploration Drilling	Emerg. Generator	1202	>=600 HP		500	28,203
MODU	Exploration Drilling	Rescue and Life Boats	1806	<600 HP		500	42,393
MODU	Exploration Drilling	Boilers	862	>=600 HP		360	14,567
MODU	Exploration Drilling	Incinerators	0	<600 HP	276	360	-

Figure F- 40. Decommissioning Analysis Identification of Emissions Factors Spreadsheet 1.

SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	9209	>=600 HP		575	248,581
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	7872	>=600 HP		360	133,043
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	134	<600 HP		360	2,266
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	855	>=600 HP		360	14,450
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	392	<600 HP		360	6,618
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0	<600 HP	125	360	-
OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	5372	>=600 HP		2880	726,240
TOTALS			51822				1514320

Figure F- 41. Decommissioning Analysis Identification of Emissions Factors Spreadsheet 2 and Final.

Decommissioning
Chukchi Sea
2014LS193 - Decommissioning

January 23, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Emission Factors

Vessel Group	Vessel Purpose	Engine Use or Purpose	Emission Factors (g/hp-hr, except g/gallon of fuel for GHGs)									
			$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2
MODU	Exploration Drilling	Propulsion	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	HPU	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Cranes	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Cementing Units	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Logging Unit	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Compressor	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Sidewall Core Tool	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Emerg. Generator	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Rescue and Life Boats	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Boilers	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
MODU	Exploration Drilling	Incinerators	0.00235	0.00125	0.0015	0.0000	0.005	0	0	0	0	0

Figure F- 42. Decommissioning Analysis Identification of Emissions Factors Spreadsheet 1.

SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	0.32	0.03	11.00	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	1.00	0.03	14.00	1.12	3.03	0.000089	1.48951075	39.80	2.77	11453.82
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0.00235	0.00125	0.0015	0.0000	0.005	0	0	0	0	0
OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	0.32	0.03	7.85	0.33	2.40	0.000089	1.48951075	39.80	2.77	11453.82

Figure F- 43. Decommissioning Analysis Identification of Emissions Factors Spreadsheet 2 and Final.

Decommissioning
Chukchi Sea
2014LS193 - Decommissioning

January 23, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Apply EFs and convert to grams per plan

Vessel Group	Vessel Purpose	Engine Use or Purpose	PROJECTED EMISSIONS (grams per plan)									
			PM_{10}	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2
MODU	Exploration Drilling	Propulsion	5.E+04	6.E+03	1.E+06	6.E+04	4.E+05	1.E+01	1.17E+04	3.12E+05	2.17E+04	9.E+07
MODU	Exploration Drilling	Power Generation	2.E+06	2.E+05	4.E+07	2.E+06	1.E+07	5.E+02	3.71E+05	9.92E+06	6.91E+05	3.E+09
MODU	Exploration Drilling	HPU	2.E+05	6.E+03	3.E+06	2.E+05	6.E+05	2.E+01	1.30E+04	3.47E+05	2.42E+04	1.E+08
MODU	Exploration Drilling	Cranes	1.E+05	1.E+04	4.E+06	1.E+05	8.E+05	3.E+01	2.43E+04	6.49E+05	4.53E+04	2.E+08
MODU	Exploration Drilling	Cementing Units	2.E+05	6.E+03	3.E+06	2.E+05	6.E+05	2.E+01	1.35E+04	3.61E+05	2.51E+04	1.E+08
MODU	Exploration Drilling	Logging Unit	9.E+04	3.E+03	1.E+06	1.E+05	3.E+05	8.E+00	6.05E+03	1.62E+05	1.13E+04	5.E+07
MODU	Exploration Drilling	Compressor	4.E+04	1.E+03	6.E+05	4.E+04	1.E+05	4.E+00	2.81E+03	7.50E+04	5.23E+03	2.E+07
MODU	Exploration Drilling	Sidewall Core Tool	2.E+04	5.E+02	2.E+05	2.E+04	5.E+04	1.E+00	1.16E+03	3.10E+04	2.16E+03	9.E+06
MODU	Exploration Drilling	Emerg. Generator	2.E+05	2.E+04	7.E+06	2.E+05	1.E+06	5.E+01	4.20E+04	1.12E+06	7.82E+04	3.E+08
MODU	Exploration Drilling	Rescue and Life Boats	9.E+05	3.E+04	1.E+07	1.E+06	3.E+06	8.E+01	6.31E+04	1.69E+06	1.18E+05	5.E+08
MODU	Exploration Drilling	Boilers	1.E+05	1.E+04	3.E+06	1.E+05	7.E+05	3.E+01	2.17E+04	5.80E+05	4.04E+04	2.E+08
MODU	Exploration Drilling	Incinerators	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.00E+00	0.00E+00	0.00E+00	0.E+00

Figure F- 44. Decommissioning Analysis Emissions Calculations for Potential Vessels Spreadsheet 1.

SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	2.E+06	2.E+05	4.E+07	2.E+06	1.E+07	5.E+02	3.70E+05	9.89E+06	6.89E+05	3.E+09
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	9.E+05	9.E+04	2.E+07	9.E+05	7.E+06	3.E+02	1.98E+05	5.29E+06	3.69E+05	2.E+09
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	5.E+04	2.E+03	7.E+05	5.E+04	1.E+05	4.E+00	3.38E+03	9.02E+04	6.29E+03	3.E+07
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	1.E+05	1.E+04	3.E+06	1.E+05	7.E+05	3.E+01	2.15E+04	5.75E+05	4.01E+04	2.E+08
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	1.E+05	5.E+03	2.E+06	2.E+05	4.E+05	1.E+01	9.86E+03	2.63E+05	1.84E+04	8.E+07
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.00E+00	0.00E+00	0.00E+00	0.E+00
OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	5.E+06	5.E+05	1.E+08	5.E+06	4.E+07	1.E+03	1.08E+06	2.89E+07	2.01E+06	8.E+09

Figure F- 45. Decommissioning Analysis Emissions Calculations for Potential Vessels Spreadsheet 2.

Decommissioning
Chukchi Sea
2014LS193 - Decommissioning

January 23, 2015
Prepared by:
Virginia Raps

Emissions Calculations

BOEM

Convert from grams to lbs per plan

Vessel Group	Vessel Purpose	Engine Use or Purpose	PROJECTED EMISSIONS (lbs per plan)									
			PM_{10}	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2
MODU	Exploration Drilling	Propulsion	118	12	2887	121	883	0.033	26	687	48	197780
MODU	Exploration Drilling	Power Generation	3746	386	91877	3863	28098	1.048	819	21872	1524	6295066
MODU	Exploration Drilling	HPU	410	14	5734	459	1241	0.037	29	765	53	220213
MODU	Exploration Drilling	Cranes	245	25	8429	253	1839	0.069	54	1432	100	412041
MODU	Exploration Drilling	Cementing Units	426	14	5960	477	1290	0.038	30	795	55	228911
MODU	Exploration Drilling	Logging Unit	191	6	2670	214	578	0.017	13	356	25	102552
MODU	Exploration Drilling	Compressor	89	3	1240	99	268	0.008	6	165	12	47614
MODU	Exploration Drilling	Sidewall Core Tool	37	1	513	41	111	0.003	3	68	5	19686
MODU	Exploration Drilling	Emerg. Generator	424	44	14569	437	3179	0.119	93	2474	172	712169
MODU	Exploration Drilling	Rescue and Life Boats	1991	66	27872	2230	6032	0.178	139	3719	259	1070479
MODU	Exploration Drilling	Boilers	219	23	7525	226	1642	0.061	48	1278	89	367827
MODU	Exploration Drilling	Incinerators	0	0	0	0	0	0.000	0	0	0	0

Figure F- 46. Decommissioning Analysis Emissions Calculations for Potential Vessels Spreadsheet 3.

SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	3736	385	91613	3852	28017	1.045	816	21809	1520	6277008
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	1999	206	49032	2062	14995	0.559	437	11672	814	3359505
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	106	4	1490	119	322	0.010	7	199	14	57228
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	217	22	7465	224	1629	0.061	47	1268	88	364885
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	311	10	4351	348	942	0.028	22	581	40	167105
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0	0	0	0	0	0.000	0	0	0	0
OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	10914	1125	267652	11255	81854	3.052	2385	63716	4441	18338558

Figure F- 47. Decommissioning Analysis Emissions Calculations for Potential Vessels Spreadsheet 4.

Decommissioning
Chukchi Sea
2014LS193 - Decommissioning

January 23, 2015
Prepared by:
Virginia Raps

Emissions Calculations

Convert from lbs to short tons per plan

Vessel Group	Vessel Purpose	Engine Use or Purpose	PROJECTED EMISSIONS (tons per plan)										
			$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
MODU	Exploration Drilling	Propulsion	0.06	0.01	1.44	0.06	0.44	0.000	0.01	0.34	0.02	99	99
MODU	Exploration Drilling	Power Generation	1.87	0.19	45.94	1.93	14.05	0.001	0.41	10.94	0.76	3148	3159
MODU	Exploration Drilling	HPU	0.20	0.01	2.87	0.23	0.62	0.000	0.01	0.38	0.03	110	111
MODU	Exploration Drilling	Cranes	0.12	0.01	4.21	0.13	0.92	0.000	0.03	0.72	0.05	206	207
MODU	Exploration Drilling	Cementing Units	0.21	0.01	2.98	0.24	0.64	0.000	0.01	0.40	0.03	114	115
MODU	Exploration Drilling	Logging Unit	0.10	0.00	1.34	0.11	0.29	0.000	0.01	0.18	0.01	51	51
MODU	Exploration Drilling	Compressor	0.04	0.00	0.62	0.05	0.13	0.000	0.00	0.08	0.01	24	24
MODU	Exploration Drilling	Sidewall Core Tool	0.02	0.00	0.26	0.02	0.06	0.000	0.00	0.03	0.00	10	10
MODU	Exploration Drilling	Emerg. Generator	0.21	0.02	7.28	0.22	1.59	0.000	0.05	1.24	0.09	356	357
MODU	Exploration Drilling	Rescue and Life Boats	1.00	0.03	13.94	1.11	3.02	0.000	0.07	1.86	0.13	535	537
MODU	Exploration Drilling	Boilers	0.11	0.01	3.76	0.11	0.82	0.000	0.02	0.64	0.04	184	185
MODU	Exploration Drilling	Incinerators	0.12	0.06	0.07	0.000	0.25	0.0000	0.00	0.00	0.00	0.00	0.00

Figure F- 48. Decommissioning Analysis Emissions Calculations for Potential Vessels Spreadsheet 5.

SUPPORT VESSESLS	Support Tugs	Propulsion and Power Generation	1.87	0.19	45.81	1.93	14.01	0.001	0.41	10.90	0.76	3139	3150
OIL SPILL RESPONSE	OSR Vessel	Propulsion and Power Generation	1.00	0.10	24.52	1.03	7.50	0.000	0.22	5.84	0.41	1680	1686
OIL SPILL RESPONSE	OSR Vessel	Emerg. Engines	0.05	0.00	0.75	0.06	0.16	0.000	0.00	0.10	0.01	29	29
OIL SPILL RESPONSE	OSR Vessel	Ancillary Engines	0.11	0.01	3.73	0.11	0.81	0.000	0.02	0.63	0.04	182	183
OIL SPILL RESPONSE	OSR Vessel	OSR Equipment	0.16	0.01	2.18	0.17	0.47	0.000	0.01	0.29	0.02	84	84
OIL SPILL RESPONSE	OSR Vessel	Incinerators	0.05	0.03	0.03	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00
OIL SPILL RESPONSE	OSR Workboats	Propulsion and Power Generation	5.46	0.56	133.83	5.63	40.93	0.002	1.19	31.86	2.22	9169	9203
TOTAL			12.76	1.26	295.55	13.14	86.82	0.00	2.49	66.43	4.63	19,119.31	19,190.37
			PROJECTED EMISSIONS PER EACH EXAMPLE EXPLORATION PLAN										
			$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}

Figure F- 49. Decommissioning Analysis Emissions Calculations for Potential Vessels Spreadsheet 6 and Final.

F-5. In Situ Oil Spill Burning

In-Situ Burning
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Oil Spill Clean-up

Potential Projected Emissions - Oil Spill In-Situ Burning

Ref: EPA, AP-42, Chapter 1, Table 1.3-15 Burn No. 6 oil/water emulsion
see also: Table 1.3-12
Table 1.3-8
Table 1.3-3

Source: EPA, AP42, Chapter 1, Section 1.3 Fuel Oil Combustion

6800 bbl of crude, mixed with water, and with emulsifiers present
42 gal per bbl conversion
285600 gal of spill

	CO	NO_x	PM	VOC	SO_2	CO_2	N_2O
lb/1000 gal	1.9	38	14.9	1.13	157	24400	0.53
lb/gal	0.0019	0.038	0.0149	0.00113	0.157	24.4	0.00053
lbs	542.64	10852.8	4255.44	322.728	44839.2	6968640	151.368
tons	0.27132	5.4264	2.12772	0.161364	22.4196	3160.922	0.068659

Figure F- 50. In Situ Oil Spill Burning Spreadsheet.

F-6. Evaporation VOCs

Evaporation
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Oil Spill Evaporation

Potential Projected Emissions - Oil Spill Evaporation

TYPE 1 - 6,800 bbl crude

6,800.00	bbl crude spilled		
90%	oil that can be evaporated		http://dec.alaska.gov/spar/perp/response/sum_fy06/060302301/factsheets/970_crudes.pdf
6,120.00	bbl of oil that could evaporate		
40%	is evaporated	Final S/SEIS Table A.1-7 for the 5,100	Final S/SEIS Table A.1-8 for the 1,700
2,448.00	bbl is evaporated		
42	gallons per barrel		
102,816	gal of crude to evaporate		
750,014	lbsavoir to evaporate	http://www.thecalculatorsite.com/conversions/substances/oil.php	
2000	lbs avoir per short ton	converted gallons to pounds, assumes 32.6 deg API at 60 F, density 862 kg/m3, to pounds troy	
375.01	tons of VOC	units of g/mL converted to kg/m3	
15	gal/bbl		
110.30	lbs/bbl		
0.055148068	tons VOC per bbl		

Type 2 - 1,700 bbls crude and 5,100 bbls diesel

1,700.00	bbl crude spilled		
90%	oil that can be evaporated		http://dec.alaska.gov/spar/perp/response/sum_fy06/060302301/factsheets/970_crudes.pdf
1,530.00	barrels of oil that could evaporate, and of this volume 65% could evaporate as it did for the GOM		
40%	is evaporated	Final S/SEIS Table A.1-7 for the 5,100	Final S/SEIS Table A.1-8 for the 1,700
612.00	barrels is evaporated		
42	gallons per barrel		
25,704.000	gallons of crude to evaporate		
187,503	pounds avoir to evaporate	http://www.thecalculatorsite.com/conversions/substances/oil.php	
2000	lbs avoir per short ton	converted gallons to pounds, assumes 32.6 deg API at 60 F, density 862 kg/m3, to pounds troy	
93.75	tons of VOC	units of g/mL converted to kg/m3	
15	gall/barr		
110.30	pds/barr		
0.055148068	tons VOC per bbl crude		

Figure F- 51. Evaporation VOCs Analysis Spreadsheet 1.

5,100.00	bbl diesel spilled		
100%	oil that can be evaporated (is comprised of HCs)		
5,100.00	bbl of oil that could evaporate		
60%	is evaporated	Final S/SEIS Table A.1-7 for the 5,100	Final S/SEIS Table A.1-8 for the 1,700
3,034.50	bbl is evaporated		
42	gal per bbl		
127,449.000	gal of diesel to evaporate		
951,258	lbs avoir to evaporate	http://www.thecalculatorsite.com/conversions/substances/oil.php	
2000	lbs avoir per short ton	converted gallons to pounds, assumes diesel fuel oil (20-60) (15C), density 55.8333 lb/ft3, to pounds avoir	
475.63	tons of VOC	units of g/mL converted to kg/m3	
25	gal/bbl		
186.52	lbs/bbl		
0.093260568	tons VOC per bbl diesel		
	TOTALS FOR TYPE II		
153,153	total gal of material to evaporate		
569.38	total VOC for Type II		
0.074204	average tons VOC per bbl diesel		

Figure F- 52. Evaporation VOCs Analysis Spreadsheet 2 and Final.

F-7. Dispersion Results

Dispersion Analysis
Chukchi Sea
2014LS193 - Scenario

January 22, 2015
Prepared by:
Virginia Raps

Gaussian Dispersion Model

$$C_\chi = \left(Q_p / \pi \, \sigma_y \sigma_z \bar{u} \right) e^{-H_e^2 / 2\sigma_z^2}$$

Gaussian Dispersion Model

Calculations of the Gaussian Dispersion Model using the following factors:

Phase of the Potential Scenario	Year of Greatest Potential Annual Emissions	Pollutant	Atmospheric Stability	Distance to the Relevent Receptor	Emission Rate	Avg. Wind Speed	Height of Receptor	Plume Width Coefficient	Plume Height Coefficient	Greatest 1-hour Concentration $C_{x_{max\ at\ x}}$
				χ (m)	Q (g/sec)	$\bar{u}$ (m/s)	H (m)	σ_y (m)	σ_z (m)	(µg/m³)
Phase 1 (Years 1-5)	Year 5	NO_x	D	97848.1152	140.99	5.64	10	4093.2	460.7	4.22
		NO_x	D	32186.88	140.99	5.64	10	1514.9	253.9	20.67
Phase 2 (Years 6-9)	Year 7	NO_x	D	97848.1152	203.52	5.64	10	4093.2	460.7	6.09
		NO_x	D	32186.88	203.52	5.64	10	1514.9	253.9	29.84
Phase 3 (Years 10-25)	Year 23	NO_x	D	97848.1152	907.24	5.64	10	4093.2	460.7	27.15
		NO_x	D	32186.88	907.24	5.64	10	1514.9	253.9	133.03
		SO_x	D	97848.1152	189.60	5.64	10	4093.2	460.7	5.67
Phase 4 (Years 26-50)	Year 30	NO_x	D	97848.1152	1,243.73	5.64	10	4093.2	460.7	37.22
		NO_x	D	32186.88	1,243.73	5.64	10	1514.9	253.9	182.37
		SO_x	D	97848.1152	301.39	5.64	10	4093.2	460.7	9.02
		CO	D	97848.1152	397.89	5.64	10	4093.2	460.7	11.91
		PM_{10}	D	97848.1152	40.53	5.64	10	4093.2	460.7	1.21
		$PM_{2.5}$	D	97848.1152	38.05	5.64	10	4093.2	460.7	1.14
Phase 5 (Years 51-77)	Year 57	NO_x	D	97848.1152	1,246.78	5.64	10	4093.2	460.7	37.31
		NO_x	D	32186.88	1,246.78	5.64	10	1514.9	253.9	182.82

60.8 s. miles = 97848.12 m
20.0 s. mi = 32186.88 m
Atmospheric stability "D" is neutral.

Figure F- 53. Dispersion Analysis Spreadsheet.

F-8. Scenario Tables

Air Quality Tables
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Table 4-19

Potential Projected Emissions by Scenario Activity - Phase 1 (Years 1-5)

Table 4-19. Greatest Potential Projected Emissions - Year 5.

Types and Number of Potential Scenario Activities		Potential Criteria and Precursor Air Pollutant Emissions, and Ammonia Emissions (tons/year)								VOC/NOx Mix. Ratio
		$PM_{2.5}$	PM_{10}	SO_2	NO_x	VOC	CO	Pb	NH_3	
Surveys	2	61.4	61.4	18.3	754.5	68.6	229.9	0.2	5.9	0.09
Exploration Drilling	2	142.4	142.4	16.5	3259.6	140.9	936.1	0.0	29.0	0.04
Construct Bases	2	50.6	53.2	20.6	782.2	89.0	1020.0	0.2	6.5	0.11
Operate Bases	5	7.2	7.2	4.3	104.8	5.9	17.0	0.5	0.9	0.06
Totals		**261.5**	**264.1**	**59.6**	**4901.0**	**304.3**	**2203.0**	**0.9**	**42.3**	**0.06**

Types and Number of Potential Scenario Activities		Potential Greenhouse Gases Emissions (metric tons/year)				Source of Data
		N_2O	CH_4	CO_2	CO_{2e}	
Surveys	2	142.08	9.90	39890	40042	BOEM, 2015.
Exploration Drilling	2	774.64	53.98	222952	223781	BOEM. 2015
Construct Bases	2	2.80	2.20	188302.00	189198.20	ERG Table A-12
Operate Bases	5	22.31	1.55	6351.59	6375.46	ERG Table VI-11
Totals		**941.84**	**67.64**	**457495.54**	**459396.21**	

"Construction" denotes the building of base camps and terminals.
"VOC/NOx Mix. Ratio" denotes indicator of potential ozone formation.

Proposed Scenario Activity	Potential Projected Emissions (short tons per activity)								Potential Projected GHG Emissions (metric tons per activity)			
	$PM_{2.5}$	$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
SURVEY	31	31	9	377	34	115	0	3	71	5	19945	20021
EXPLORATION	71	71	8	1630	70	468	0	15	387	27	111476	111890
OPERATE BASE	1	1	1	21	1	3	0	0	4	0	1270	1275
CONSTRUCT BASE	25	27	10	391	45	510	0	3	1	1	94151	94599

Pb emissions are assumed to be 0.1 tons/yr where emissions factors are not available for an activity.
1 metric ton is equal to 2204.622622 lbs
NH3 and GHG emissions based on percentage of known emissions to NOx emissions.

Figure F- 54. Scenario Table 4-19 for Scenario Phase 1, Year 5 Spreadsheet.

Air Quality Tables
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Table 4-20

Potential Projected Emissions by Scenario Activity - Phase 2 (Years 6-9)

Table 4-20. Greatest Potential Projected Emissions - Year 7.

Types and Number of Potential Scenario Activities		Potential Criteria and Precursor Air Pollutant Emissions, and Ammonia Emissions								VOC/NOx Mix. Ratio
		$PM_{2.5}$	PM_{10}	SO_2	NO_x	VOC	CO	Pb	NH_3	
Surveys	2	61.4	61.4	18.3	754.5	68.6	229.9	0.2	5.9	0.09
Exploration Drilling	2	142.4	142.4	16.5	3259.6	140.9	936.1	0.0	29.0	0.04
Operate Bases	5	7.2	7.2	4.3	104.8	5.9	17.0	0.5	0.9	0.06
Construct Platform	1	10.3	14	0.06	537.9	30.5	62.5	0.2	4.48	0.06
Offshore Pipeline Install	40 miles	19.3	26.3	1.0	1705.1	87.0	191.4	0.004	14.2	0.05
Onshore Pipeline Install	75 miles	53.4	98.1	1.4	713.1	55.7	398.4	0.1	5.9	0.08
Totals		**293.9**	**349.3**	**41.5**	**7074.9**	**388.5**	**1835.3**	**1.04**	**60.4**	**0.05**

Types and Number of Potential Scenario Activities		Potential Greenhouse Gases Emissions				Source of Data
		N_2O	CH_4	CO_2	CO_{2e}	
Surveys	2	142.08	9.90	39890	40042	BOEM, 2015.
Exploration Drilling	2	774.64	53.98	222952	223781	BOEM. 2015
Operate Bases	5	22.31	1.55	6351.59	6375.46	ERG Table VI-11
Construct Platform	1	2.9	0.4	60024	60027.3	ERG Table IV-8 & -9
Offshore Pipeline Install	40 milies	5.4	0.7	112413.0	114037.8	ERG Table VI-8 & -9
Onshore Pipeline Install	75 miles	3.5	2.5	164395.0	164401.0	ERG Table VI-11 & -12
Totals		**950.84**	**69.04**	**606025.54**	**608664.11**	

"Construction" denotes the building of base camps and terminals.

"VOC/NOx Mix. Ratio" denotes indicator of potential ozone formation.

Proposed Scenario Activity	Potential Projected Emissions (short tons per activity)								Potential Projected GHG Emissions (metric tons per activity)			
	$PM_{2.5}$	$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
SURVEY	31	31	9	377	34	115	0.1	3	71	5	19945	20021
EXPLORATION	71	71	8	1630	70	468	0.0	15	387	27	111476	111890
OPERATE BASE	1.4	1.4	0.9	21.0	1.2	3.4	0.100	0	4	0	1270	1275
CONSTRUCT PLATFORM	10	14	0	538	31	63	0.2	4	3	0	60024	60027
ONSHORE PIPELINE	53.40	98.10	1.40	713.10	55.70	398.40	0.1	5.94	3.50	2.50	164395.00	164401.00
OFFSHORE PIPELINE	19.30	26.30	1.00	1705.10	87.00	191.40	0.0	14.21	5.40	0.70	112413.00	114037.80

Pb emissions are assumed to be 0.1 tons/yr where emissions factors are not available for an activity.

1 metric ton is equal to 2204.622622 lbs

NH3 and GHG emissions based on percentage of known emissions to NOx emissions.

Figure F- 55 Scenario Table 4-20 for Scenario Phase 2, Year 7 Spreadsheet

Air Quality Tables
Chukchi Sea
2014LS193 Scenario

Tbl 4-23 Year 23

January 22, 2015
Prepared by:
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Table 4-23

Potential Projected Emissions by Scenario Activity - Phase 3 (Years 10-25)

Table 4-23. Greatest Potential Projected Emissions - Year 23.

Types and Number of Potential Scenario Activities		Potential Criteria and Precursor Air Pollutant Emissions, and Ammonia Emissions								VOC/NOx Mix. Ratio
		$PM_{2.5}$	PM_{10}	SO_2	NO_x	VOC	CO	Pb	NH_3	
Surveys	1	30.7	30.7	9.1	377.2	34.3	115.0	0.1	2.9	0.09
Exploration Drilling	3	213.5	213.5	24.7	4889.4	211.3	1404.2	0.1	43.5	0.04
Operate Bases	5	7.2	7.2	4.3	104.8	5.9	17.0	0.5	0.9	0.06
Operate Platform	5	774	795	6530	25308.5	908.5	8250.5	0.01	210.9	0.04
Offshore Pipeline Install	20 miles	9.7	13.2	0.5	852.6	43.5	95.7	0.0	7.1	0.05
Oil Spill Evaporation						569.4				NA
In-Situ Burning		2.1	2.1	22.4	5.4	0.16	0.27	0	0.0	0.03
Totals		1037.2	1061.7	6591.0	31537.9	1773.1	9882.6	0.7	265.3	0.06

BOEM, 2015.

Types and Number of Potential Scenario Activities		Potential Greenhouse Gases Emissions				Source of Data
		N_2O	CH_4	CO_2	CO_{2e}	
Surveys	1	71.04	4.95	19945	20021	BOEM, 2015.
Exploration Drilling	3	1161.96	80.97	334428	335671	BOEM. 2015
Operate Bases	5	22.31	1.55	6351.59	6375.46	ERG Table VI-11
Operate Platform	5	1936.5	629945	10212195	10844076.5	ERG Table IV-8 & -9
Offshore Pipeline Install	20 miles	5.4	0.7	112413.0	114037.8	ERG Table VI-8 & -9
In-Situ Burning		0.069	0.0	3161.0	3161.1	
Totals		3197	630033	10688494	11323343	

"Construction" denotes the building of base camps and terminals.

"VOC/NOx Mix. Ratio" denotes indicator of potential ozone formation.

Proposed Scenario Activity	Potential Projected Emissions								Potential Projected GHG Emissions			
	$PM_{2.5}$	$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
SURVEY	30.7	30.7	9.1	377.2	34.3	115.0	0.100	3	71.0	5.0	19945	20021
EXPLORATION	71	71	8	1630	70	468	0.0	15	387	27	111476	111890
OPERATE BASE	1.4	1.4	0.9	21.0	1.2	3.4	0.100	0	4.5	0.3	1270	1275
OPERATE PLATFORM	154.8	159.0	1306.0	5061.7	181.7	1650.1	0.002	42	387.3	125989.0	2042439	2168815
ONSHORE PIPELINE	53.4	98.1	1.4	713.1	55.7	398.4	0.100	5.94	3.5	2.5	164395.00	164401.00
OFFSHORE PIPELINE	9.7	13.2	0.5	852.6	43.5	95.7	0.002	7.10	2.7	0.4	56207	57019
IN-SITU BURNING	2.1	2.1	22.4	5.4	0.2	0.3			0.1		3161	3161

Pb emissions are assumed to be 0.1 tons/yr where emissions factors are not available for an activity.

1 metric ton is equal to 2204.622622 lbs

NH3 and GHG emissions based on percentage of known emissions to NOx emissions.

Figure F- 56. Scenario Table 4-23 for Scenario Phase 3, Year 23 Spreadsheet

Air Quality Tables — January 22, 2015
Chukchi Sea — Prepared by:
2014LS193 Scenario — Virginia Raps

Table 4-24

Potential Projected Emissions by Scenario Activity - Phase 4 (Years 26-50)

Table 4-24. Greatest Potential Projected Emissions - Year 30.

Types and Number of Potential Scenario Activities		Potential Criteria and Precursor Air Pollutant Emissions, and Ammonia Emissions								VOC/NOx Mix. Ratio
		$PM_{2.5}$	PM_{10}	SO_2	NO_x	VOC	CO	Pb	NH_3	
Operate Bases	5	7.2	7.2	4.3	104.8	5.9	17.0	0.5	0.9	0.06
Operate Platform	8	1238.4	1272	10448	40493.6	1453.6	13200.8	0.016	337.5	0.04
Offshore Pipeline Install	45 miles	21.7	29.6	1.1	1918.2	97.9	215.3	0.005	16.0	0.06
Onshore Pipeline Install	75 miles	53.4	98.1	1.4	713.1	55.7	398.4	0.1	5.9	0.04
Oil Spill Evaporation						569.4				NA
In-Situ Burning		2.1	2.1	22.4	5.4	0.16	0.27	0	0.0	0.03
Totals		**1322.8**	**1409.0**	**10477.2**	**43235.1**	**2182.6**	**13831.8**	**0.6**	**360.3**	**0.04**

BOEM, 2015.

Types and Number of Potential Scenario Activities		Potential Greenhouse Gases Emissions				Source of Data
		N_2O	CH_4	CO_2	CO_{2e}	
Operate Bases	5	22.31	1.55	6351.59	6375.46	ERG Table VI-11
Operate Platform	8	3098.4	1007912	16339512	17350522.4	ERG Table IV-8 & -9
Offshore Pipeline Install	45 miles	6.1	0.8	126464.6	128292.5	ERG Table VI-8 & -9
Onshore Pipeline Install	75 miles	3.5	2.5	164395.0	164401.0	ERG Table VI-11 & -12
In-Situ Burning		0.069	0.0	3161.0	3161.1	BOEM, 2015.
Totals		**3130**	**1007917**	**16639884**	**17652752**	

"Construction" denotes the building of base camps and terminals.

"VOC/NOx Mix. Ratio" denotes indicator of potential ozone formation.

Proposed Scenario Activity	Potential Projected Emissions								Potential Projected GHG Emissions			
	$PM_{2.5}$	$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
SURVEY	30.7	30.7	9.1	377.2	34.3	115.0	0.100	3	71.0	5.0	19945	20021
EXPLORATION	71	71	8	1630	70	468	0.0	15	387	27	111476	111890
OPERATE BASE	1.4	1.4	0.9	21.0	1.2	3.4	0.100	0	4.5	0.3	1270	1275
OPERATE PLATFORM	154.8	159.0	1306.0	5061.7	181.7	1650.1	0.002	42	387.3	125989.0	2042439	2168815
ONSHORE PIPELINE	53.4	98.1	1.4	713.1	55.7	398.4	0.1	5.9	3.5	2.5	164395.0	164401.0
OFFSHORE PIPELINE	21.7	29.6	1.1	1918.2	97.9	215.3	0.0	16.0	6.1	0.8	126464.6	128292.5
IN-SITU BURNING	2.1	2.1	22.4	5.4	0.2	0.3			0.1		3161	3161

Pb emissions are assumed to be 0.1 tons/yr where emissions factors are not available for an activity.

1 metric ton is equal to 2204.622622 lbs

NH3 and GHG emissions based on percentage of known emissions to NOx emissions.

Figure F- 57. Scenario Table 4-24 for Scenario Phase 4, Year 30 Spreadsheet.

Air Quality Tables
Chukchi Sea
2014LS193 Scenario

January 22, 2015
Prepared by:
Virginia Raps

Table 4-25

Potential Projected Emissions by Scenario Activity - Phase 5 (Years 51-77)

Table 4-25. Greatest Potential Projected Emissions - Year 57.

Types and Number of Potential Scenario Activities		Potential Criteria and Precursor Air Pollutant Emissions, and Ammonia Emissions								VOC/NOx Mix. Ratio
		$PM_{2.5}$	PM_{10}	SO_2	NO_x	VOC	CO	Pb	NH_3	
Operate Bases	5	7.2	7.2	4.3	104.8	5.9	17.0	0.5	0.9	0.06
Operate Platform	8	1238.4	1272	10448	40493.6	1453.6	13200.8	0.016	337.4	0.04
Decommissioning	3	38.3	38.3	3.8	886.7	39.4	260.5	0.01	7.5	0.06
Oil Spill Evaporation						569.4				NA
In-Situ Burning		2.1	2.1	22.4	5.4	0.16	0.27	0	0.0	0.03
Totals		**1286.0**	**1319.6**	**10478.5**	**41490.4**	**2068.5**	**13478.5**	**0.6**	**345.8**	**0.04**

BOEM, 2015.

Types and Number of Potential Scenario Activities		Potential Greenhouse Gases Emissions				Source of Data
		N_2O	CH_4	CO_2	CO_{2e}	
Operate Bases	5	22.31	22.31	6351.53	6396.15	ERG Table VI-11
Operate Platform	8	3098.4	1007912	16339512	17350522.4	ERG Table VI-8 & -9
Decommissioning	3	199.3	13.9	57357.0	57570.2	BOEM, 2015.
In-Situ Burning		0.069	0.1	3161.0	3161.1	BOEM, 2015.
Totals		**3320.1**	**1007948**	**16406382**	**17417650**	

"Construction" denotes the building of base camps and terminals.

"VOC/NOx Mix. Ratio" denotes indicator of potential ozone formation.

Proposed Scenario Activity	Potential Projected Emissions								Potential Projected GHG Emissions			
	$PM_{2.5}$	$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
SURVEY	30.7	30.7	9.1	377.2	34.3	115.0	0.100	3	71.0	5.0	19945	20021
EXPLORATION	71	71	8	1630	70	468	0.0	15	387	27	111476	111890
OPERATE BASE	1.4	1.4	0.9	21.0	1.2	3.4	0.100	0.175	4.5	4.5	1270	1279
OPERATE PLATFORM	154.8	159.0	1306.0	5061.7	181.7	1650.1	0.002	42	387.3	125989.0	2042439	2168815
ONSHORE PIPELINE	53.4	98.1	1.4	713.1	55.7	398.4	0.1	6	3.5	2.5	164395.0	164401.0
OFFSHORE PIPELINE	21.7	29.6	1.1	1918.2	97.9	215.3	0.0	16	6.1	0.8	126464.6	128292.5
DECOMMISSIONING	12.8	12.8	1.3	295.6	13.1	86.8	0.0	2.5	66.4	4.6	19119.0	19190.1
IN-SITU BURNING	2.1	2.1	22.4	5.4	0.2	0.3	0.100	0.05	0.1	0.1	3161	3161

Pb emissions are assumed to be 0.1 tons/yr where emissions factors are not available for an activity.

1 metric ton is equal to 2204.622622 lbs

NH3 and GHG emissions based on percentage of known emissions to NOx emissions.

ERG Table VI-11 & -12	$PM_{2.5}$	$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
Onshore Pipeline	53.4	98.1	1.4	713.1	55.7	398.4	0.1000	5.9	3.5	2.5	164395.0	164401.0
Onshore Pipeline	0.7	1.3	0.0	9.5	0.7	5.3	0.0013	0.1	0.0	0.0	2191.9	2192.0

ERG Table IV-8 & -9	$PM_{2.5}$	$PM_{10+2.5}$	SO_2	NO_x	VOC	CO	Pb	NH_3	N_2O	CH_4	CO_2	CO_{2e}
Offshore Pipeline	19.3	26.3	1.0	1705.1	87.0	191.4	0.0040	14.2	5.4	0.7	112413.0	114037.8
Offshore Pipeline	0.5	0.7	0.0	42.6	2.2	4.8	0.0001	0.4	0.1	0.0	2810.3	2850.9

Figure F- 58. Scenario Table 4-25 for Scenario Phase 5, Year 57 Spreadsheet.

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The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island communities.

BOEM
Bureau of Ocean Energy Management

The Bureau of Ocean Energy Management Mission

The Bureau of Ocean Energy Management (BOEM) promotes energy independence, environmental protection, and economic development through responsible, science-based management of offshore conventional and renewable energy.