VINEYARD MID-ATLANTIC

CONSTRUCTION AND OPERATIONS PLAN

VOLUME I APPENDIX

JANUARY 2025

PREPARED BY:

Epsilon ASSOCIATES INC.

SUBMITTED BY:

VINEYARD MID-ATLANTIC LLC

VINEYARD MID-ATLANTIC

VINEYARD OFFSHORE

PUBLIC VERSION

Vineyard Mid-Atlantic COP

Appendix I-F Draft Oil Spill Response Plan

Prepared by:
Epsilon Associates and RPS

Prepared for:
Vineyard Mid-Atlantic LLC

January 2025

Revision	Date	Description
0	January 2024	Initial submission.
1	January 2025	Updated to incorporate revisions to the Project Design Envelope.

Response Plan Cover Sheet

A Response Plan Cover Sheet, presenting basic information regarding Vineyard Mid-Atlantic, is provided below:

Owner/operator of facility:	**Vineyard Mid-Atlantic LLC**		
Facility name:	**Vineyard Mid-Atlantic**		
Facility mailing address:	**200 Clarendon Street, 18th Floor, Boston, MA 02116**		
Facility phone number:	**(MA Office) 617.362.3872** **(NY Office) 347.851.7684**	Latitude:	**40.241° N**
SIC code:	**4911**	Longitude:	**73.079° W**
Dun and Bradstreet number: To be determined (TBD)			
Largest aboveground oil storage capacity (gals):	**308,025 for Electrical Service Platform (ESP)**	Maximum oil storage capacity (gals):	**337,969 (per ESP)**
Number of aboveground oil storage tanks:	**2 units per ESP**	Worst case oil discharge amount (gals):	**337,969 (per ESP)**

Facility distance to navigable water. Mark the appropriate line:							
0-1/4 mile:	**X**	1/4-1/2 mile:		1/2-1 mile		> 1 mile:	

Applicability of Substantial Harm Criteria:				
Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?	**YES**	**X**	NO	
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and, within any storage area, does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation?	YES		**NO**	**X**
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments?	YES		**NO**	**X**
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance such that a discharge from the facility would shut down a public drinking water intake?	YES		**NO**	**X**

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?	YES		**NO**	**X**

Management Certification

This plan has been developed for Vineyard Mid-Atlantic to prevent and/or control the spills of oil. Vineyard Mid-Atlantic LLC herein commits the necessary resources to fully prepare and implement this plan and has obtained through contract the necessary private personnel and equipment to respond, to the maximum extent practicable, to a worst case discharge or substantial threat of such a discharge.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and that based on my inquiry of those individuals responsible for obtaining information, I believe that the submitted information is true, accurate and complete.

Signature: ______________________ Title: ______________________

Name: ______________________ Date: ______________________

30 CFR 254.30(a): OSRP Review

Date	Name of Reviewer &Title	Signature

30 CFR 254.30(b): Revision Record

Revision Number	Revision Date	Pages and/or Sections Affected	Description of Revision

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List of Acronyms

ACP	Area Contingency Plan
AQI	Alternate Qualified Individuals
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
COP	Construction and Operations Plan
CTV	crew transfer vessels
DE DNREC	Delaware Department of Natural Resources and Environmental Control
DOI	Department of the Interior
EPA	Environmental Protection Agency
ERT	Emergency Response Team
ESI	Environmental Sensitivity Index
ESP	electrical service platform
ft	feet
FOSC	Federal On-Scene Coordinator
FSE	Full-Scale Exercise
GIUE	Government-Initiated Unannounced Exercise
GRS	Geographic Response Strategies
HSPD-5	Homeland Security Presidential Directive 5
IAP	Incident Action Plan
ICS	Incident Command System
IMT	Incident Management Team

List of Acronyms (Continued)

IRIS	Incident Reporting Information System
LEPC	Local Emergency Planning Committee
m	meters
MassDEP	Massachusetts Department of Environmental Protection
mi	miles
MDE	Maryland Department of the Environment
NIMS	National Incident Management System
NM	nautical miles
NJDEP	New Jersey Department of Environmental Protection
NOAA	National Oceanic and Atmospheric Administration
NYSDEC	New York State Department of Environmental Conservation
OCS	Outer Continental Shelf
OECC	offshore export cable corridor
OHM	Oil & Hazardous Material
OSC	On Scene Coordinator
OSHA	Occupational Safety & Health Administration
OSPD	Oil Spill Preparedness Division
OSRO	Oil Spill Removal Organization
OSRP	Oil Spill Response Plan
OSRV	Oil Spill Recovery Vessels
OWS	oil/water separator
PDE	Project Design Envelope
POI	Point of Interconnection
PPE	personal protective equipment
PREP	Preparedness for Response Exercise Program
QI	Qualified Individuals
RCP	Regional Contingency Plan
RIDEM	Rhode Island Department of Environmental Management
RRT	Regional Response Team
SATV	service accommodation and transfer vessels
SDS	Safety Data Sheets
SHPO	State Historic Preservation Officer
SMT	Spill Management Team
SOSC	State On Scene Coordinator
SOV	service operation vessels
SPCC	Spill Prevention, Control, and Countermeasure
TBD	To Be Determined
TTX	IMT Tabletop Exercise
USCG	United States Coast Guard
VDEM	Virginia Department of Emergency Management
VDEQ	Virgina Department of Environmental Quality
WTG	Wind Turbine Generator

1 Plan Introduction Elements

1.1 Purpose and Scope of Plan Coverage

Vineyard Mid-Atlantic LLC (the "Proponent") proposes to develop, construct, and operate offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0544 (the "Lease Area") along with associated offshore and onshore transmission systems. This proposed development is referred to as "Vineyard Mid-Atlantic." Vineyard Mid-Atlantic includes 118 total wind turbine generator (WTG) and electrical service platform (ESP) positions within the Lease Area.[1] One or two of those positions will be occupied by ESPs and the remaining positions will be occupied by WTGs. The WTGs and ESP(s) will be oriented in a west-northwest to east-southeast rows and north to south columns with 0.68 nautical mile (NM) (1.3 kilometer [km]) spacing between positions. Between the Lease Area and shore, the offshore export cable corridor (OECC) will connect the renewable wind energy facilities to onshore transmission systems in New York. The Lease Area is one of six New York Bight Lease Areas identified by BOEM, following a public process and environmental review, as suitable for wind energy development.

At its closest point, the Lease Area is approximately 38 kilometers (km) (24 miles [mi]) south of Fire Island, New York. The closest WTG/ESP position within the Lease Area is approximately 38 km (24 mi) from Fire Island. While the final ESP location(s) have not yet been determined, two representative locations at the northeast and southwest corners of the Lease Area were selected for analysis. One of the representative ESP locations (ESP 1) is located closest to New York's shoreline approximately 38 km (24 mi) from Fire Island, NY, while a second representative ESP location is located closest to New Jersey's shoreline approximately 66 km (41 mi) from Long Branch Beach, NJ. These two representative ESP locations provide an Envelope for the one or two ESPs that could be installed at any location in the Lease Area. These sites are displayed in Figure 1.1-1.

This Oil Spill Response Plan (OSRP) does not include response actions for Vineyard Mid-Atlantic-related vessels operating within the Lease Area as it is anticipated that such vessels would manage a spill based on their Vessel Response Plans.

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[1] As further described in Section 2.3, six WTG/ESP positions along the northwestern boundary of Lease Area OCS-A 0544 are contingent upon the final layout of the neighboring Empire Wind 2 project. Vineyard Mid-Atlantic will not develop these contingent WTG/ESP positions if the final Empire Wind 2 layout includes WTGs at immediately adjacent positions within Lease Area OCS-A 0512.

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Data Source: U.S. Bureau of Ocean Energy Management (BOEM), National Oceanic and Atmospheric Administration (NOAA)

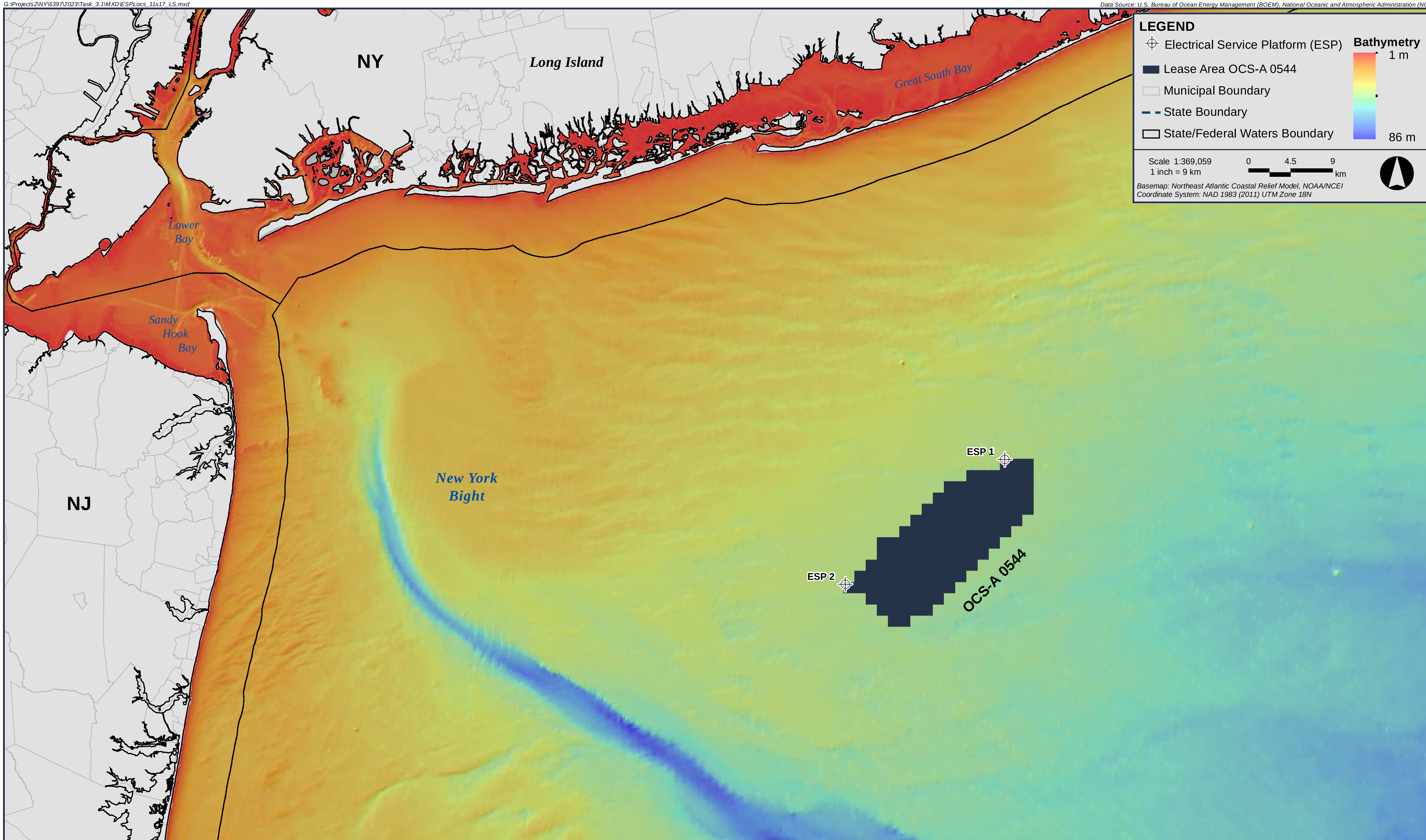

Figure 1.1-1

Locations of Potential ESP 1 and 2 in the Vineyard Mid-Atlantic Lease Area

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This OSRP covers Vineyard Mid-Atlantic's offshore facilities. The OSRP provides clear notification and activation procedures and identifies shore-based resources to respond to an oil spill or the substantial threat of an oil discharge from any Vineyard Mid-Atlantic WTG or ESP. This OSRP describes the oil spill response for spills from the WTGs and ESPs located in the Lease Area. This current OSRP is a draft plan. The OSRP will be finalized for Bureau of Safety and Environmental Enforcement (BSEE), an agency of the Department of the Interior (DOI), and BOEM review and approval prior to construction.

The Lease Area will occupy 174 square kilometers (km^2) (43,056 acres). The worst case oil discharge associated with Vineyard Mid-Atlantic is conservatively assessed as a catastrophic discharge of all oil contents from the topple of an ESP located closest to shore.

The oil sources in the WTGs include transformer oil, drive train main bearing oil, hydraulic oil, and grease (which could be hydrocarbon-based), which total approximately 6,604 gallons (157 barrels [bbl]) for the largest WTG. Oil sources in the ESPs include diesel oil from the emergency generator, diesel engine, and fuel oil storage tank and naphthenic oil from the emergency generator, platform crane, power transformers, reactors, auxiliary/earthing transformers, and other general sources. The oil sources associated with one ESP total approximately 337,969 gallons (8,047 barrels [bbl]).

Table 1.1-1 provides general information for Vineyard Mid-Atlantic as it pertains to planning for potential oil spills.

Table 1.1-1 Facility Summary Information

Facility Owner	**Vineyard Mid-Atlantic LLC**
Facility Name	Vineyard Mid-Atlantic
Facility Mailing Address	200 Clarendon Street, 18th Floor Boston, MA 02116
Facility Qualified Individual	Rachel Pachter
Facility Phone Number	(MA Office) 617.362.3872 (NY Office) 347.851.7684
E-mail Address	rpachter@vineyardoffshore.com (email of Qualified Individual)
Latitude	40.241° N
Longitude	73.079° W
SIC Code	4911
Wind Turbine Generators (WTGs)	Largest oil source in the WTGs is the 66-kilovolt transformer: 3,963 gallons (94 bbl) Total oil storage is 6,604 gallons (157 bbl) WTGs are equipped with secondary containment which is sized according with the largest container.
Electrical Service Platforms (ESPs): Emergency Generators, Diesel Engine, and Fuel Oil Storage Tank	Each ESP contains emergency generators containing diesel day tanks and lubrication oil, a diesel engine, and a fuel oil storage tank totaling 28,478 gallon (678 bbl).

Table 1.1-1 Facility Summary Information (Continued)

Facility Owner	Vineyard Mid-Atlantic LLC
ESP: Transformers and Reactors	ESP will have power transformers, auxiliary / earthing transformers, and reactors Total naphthenic oil storage is 308,025 gallons (7,334 bbl) per ESP
ESP: Other	Naphthenic hydraulic oil for platform crane: 569 gallons (14 bbl) per ESP Additional naphthenic oil per ESP: 872 gallons (21 bbl)
Operations and Maintenance (O&M) Facilities	TBD, multiple ports identified in the Construction and Operations Plan (COP) Volume 1, Table 4.4-1
Materials Stored / Oil Storage Start-Up Date	Petroleum-based and synthetic oil / TBD
Worst Case Discharge Volume[1]	337,969 gallons (8,047 bbl) per ESP
Maximum Most Probable Discharge Volume (United States Coast Guard [USCG]) [2]	33,797 gallons (805 bbl) per ESP
Average Most Probable Discharge Volume (USCG) [2]	3,380 gallons (80 bbl) per ESP
Oil Spill Removal Organization (OSRO)	TBD

Notes:

1. The BSEE/BOEM "OSRP for Offshore Wind Facilities Discussion Handout" provided guidance on worst-case discharge volume for an offshore wind facility.
2. Definitions in 33 CFR 155.1020 are based on the percentage of oil cargo capacity from a vessel during an oil transfer operation.

The Lease Area is located in the Outer Continental Shelf (OCS), as defined by 30 CFR 254.6 and Section 2 of the Submerged Lands Act (43 U.S.C. 1301). Therefore, this plan was written in accordance with the requirements of 30 CFR 254, Subpart B, Oil Spill Response Plans for Outer Continental Shelf Facilities. The OSRP demonstrates that Vineyard Mid-Atlantic can respond effectively in the unlikely event that oil is discharged in the Lease Area. As required by 30 CFR 254.22(d), Table 1.1-2 provides a cross-reference matrix of the location in this OSRP where all the 30 CFR 254 requirements can be found.

Table 1.1-2 OSRP Cross-Reference Matrix

Oil Spill Response Plans for Outer Continental Shelf Facilities 30 CFR 254, Subpart B		Plan References
254.21(b)(1)	**Introduction and OSRP contents**	
254.22(a)	Facility location and type	Section 1.1
254.22(b)	Table of contents	Table of Contents
254.22(c)	Record of changes	Not Applicable
254.21(b)(2)	**Emergency response action plan**	
254.23(a)	Designation of QI	Section 2.2, Table 2.2-1 Section 2.3
254.23(b)	Designation of spill management team	Section 2.2.1

Table 1.1-2 OSRP Cross-Reference Matrix (Continued)

Oil Spill Response Plans for Outer Continental Shelf Facilities 30 CFR 254, Subpart B		Plan References
254.23(c)	Spill response operating team	Section 2.2.1
254.23(d)	Spill response operation center	Section 2.2.1
254.23(e)	Oil stored, handled, or transported	Section 5.2
254.23(f)	Procedures for early detection of a spill	Section 2.1 and 2.4
254.23(g)(1)	Spill notification procedures	Section 2.2 and Annex 1
254.23(g)(2)	Methods to monitor/predict spill movement	Section 2.1 and 2.4.1
254.23(g)(3)	Methods to prioritize areas of importance	Section 2.5
254.23(g)(4)	Methods to protect areas of importance	Section 2.5
254.23(g)(5)	Containment and recovery equipment/personnel deployment	Section 2.5
254.23(g)(6)	Storage of recovered oil	Section 2.6
254.23(g)(7)	Procedures to remove oil and oil debris from shallow waters	Section 2.4 and 2.5
254.23(g)(8)	Procedure to store, transfer, and dispose of recovered oil and oil-contaminated materials	Section 2.6
254.23(g)(9)	Methods to implement dispersant use plan and in situ burning plan	Sections 2.7 and 2.8
254.21(b)(3)(i)	**Equipment inventory**	
254.24(a)	Inventory of spill response resources	Section 3
254.24(b)	Procedures for inspecting and maintaining spill response equipment	Sections 3.5-3.8
254.21(b)(3)(ii)	**Contractual agreements**	
254.25	Proof of contracts or membership agreements	Section 4
254.21(b)(3)(iii)	**Worst case discharge scenario**	
254.26(a)	Volume of worst case discharge	Sections 5.1 and 5.2C
254.26(b)	Trajectory analysis	Section 5.3 and Annex 5
254.26(c)	List of special economic and environmentally important resources	Sections 2.4.2, 2.5, and 5.4
254.26(d)(1)	Response equipment	Section 3 and 5.5
254.26(d)(2)	Personnel, materials, and support vessels	Section 5.5-1
254.26(d)(3)	Oil storage, transfer, and disposal equipment	Section 3
254.26(d)(4)	Estimation of time to mobilize	Section 5.5-15
254.26(e)	Suitability of response	Section 5.4-1
254.21(b)(3)(iv)	**Dispersant use plan**	
254.27(a)	Inventory and location of the dispersants	Section 2.7
254.27(b)	Toxicity data	Section 2.7
254.27(c)	Description and location of equipment required and estimate of application timeline	Section 2.7
254.27(d)	Application procedure	Section 2.7
254.27(e)	Conditions for product use request	Section 2.7
254.27(f)	Procedure for product use approval	Section 2.7

Table 1.1-2 OSRP Cross-Reference Matrix (Continued)

Oil Spill Response Plans for Outer Continental Shelf Facilities 30 CFR 254, Subpart B		Plan References
254.21(b)(3)(vi)	**In situ burning plan**	
254.28(a-g)	Equipment, burning procedures, environmental effects, safety, appropriate burn circumstances, decision to ignite, and procedures for burn approval	Section 2.8
254.21(b)(3)(vi)	**Training and drills**	
254.29(a)	Training	Sections 6.1 and 6.2
254.29(b)	Drills	Sections 6.1 and 6.2
254.30	Revision of OSRP	Not Applicable

The purpose of this OSRP is to provide a written procedure for directing a plan of action in the event of a discharge of oil in the Lease Area. The discharge may be the result of a spill, accident, natural disaster, or civilian threat. This OSRP adopts procedures to allow for a uniform plan of action that will assist in a systematic and orderly manner of response to any oil discharge incident. This plan of action will minimize confusion and indecision, prevent extensive damage to Vineyard Mid-Atlantic or injury to personnel, and minimize exposure to personnel within or outside of the Lease Area. Routine training and exercises regarding the content of this plan will provide the confidence needed for employees to perform their assigned duties if such an event occurs. Designated Qualified Individual (QI) and Alternate Qualified Individuals (AQI) are considered Emergency Coordinators. In addition, a Spill Response Coordinator and alternate Spill Response Coordinator will be identified to lead any spill response effort. Personnel, through the use of this OSRP, will utilize all resources necessary to bring any discharge under control. To prepare for such control, all personnel will be well trained and knowledgeable as to their various roles during an incident.

The OSRP was prepared considering the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR §300), or National Contingency Plan (NCP), the Region I Regional Response Team (RRT) Regional Contingency Plan (RCP), the Region II RRT RCP, the Region III RRT RCP, the Sector Long Island Sound Area Contingency Plan (ACP), the Sector New York ACP, the Rhode Island, and Southeastern Massachusetts ACP (also commonly referred to as the Southeastern New England ACP), and the Delaware Bay ACP. Oil released from a spill within Vineyard Mid-Atlantic has the potential to reach the shorelines within one or more of these ACP Planning Areas.

- The Region I RRT RCP is available at: https://www.nrt.org/sites/38/files/2021%20Regional%20Contingency%20Plan.pdf.

- The Region II RRT RCP is available at: www.nrt.org/sites/47/files/Final%20R2%20RCP%20Revised%20December%202020.pdf

- The Region III RRT RCP is available at: https://www.nrt.org/sites/72/files/2019-11-20_Final_RRT3_%20RCP_rev1.pdf

- The Sector Long Island Sounds ACP is available at: https://homeport.uscg.mil/Lists/Content/Attachments/65980/LIS%20ACP%20May%202023.pdf

- The Sector New York ACP is available at: https://homeport.uscg.mil/Lists/Content/Attachments/60651/Current%20ACP%2020180906%20(1).pdf

- The Rhode Island and Southeastern Massachusetts ACP is available at: https://homeport.uscg.mil/Lists/Content/Attachments/2471/2020 SEMA and RI Area Contingency Plan.pdf

- The Sector Delaware Bay ACP is available at: https://homeport.uscg.mil/Lists/Content/Attachments/2887/Delaware%20Bay%20ACP%20-%202019.1.pdf

- The Sector Maryland ACP is available at: https://homeport.uscg.mil/Lists/Content/Attachments/82382/ACP_MARYLAND_NCR_2021.2.pdf

- The Sector Virgina ACP is available at: https://homeport.uscg.mil/Lists/Content/Attachments/80788/2021%20Virginia%20ACP.pdf

The location of the Vineyard Mid-Atlantic Lease Area is within the Long Island Sound ACP Planning Area and under the USCG Federal On-Scene Coordinator (FOSC) at Sector Long Island Sound. The Lease Area is wholly within Region II for the RRT and Region 2 for the Environmental Protection Agency (EPA). However, an unmitigated oil spill from Vineyard Mid-Atlantic could reach the coasts of New York, New Jersey, Delaware, Connecticut, Rhode Island, Massachusetts, Maryland, and/or Virgina,[2] which are covered by RRT Regions I, II, III, and the USCG FOSC at Sector Rhode Island and Southeastern Massachusetts, Sector New York, Sector Long Island, Sector Delaware Bay, Sector Maryland, and Sector Virgina. Figure 1.1-2 shows the relation of the Lease Area to these regulatory areas. The locations of the USCG Districts are provided in Figure 1.1-3.

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2 As discussed further in Annex 5, according to the oil spill modeling analysis performed for Vineyard Mid-Atlantic, oil could only potentially reach the shorelines of Delaware, Maryland, and Virginia if a worst case oil release were to occur between the months of September and November and no response actions were taken.

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Data Source: U.S. Bureau of Ocean Energy Management (BOEM), National Oceanic and Atmospheric Administration (NOAA)

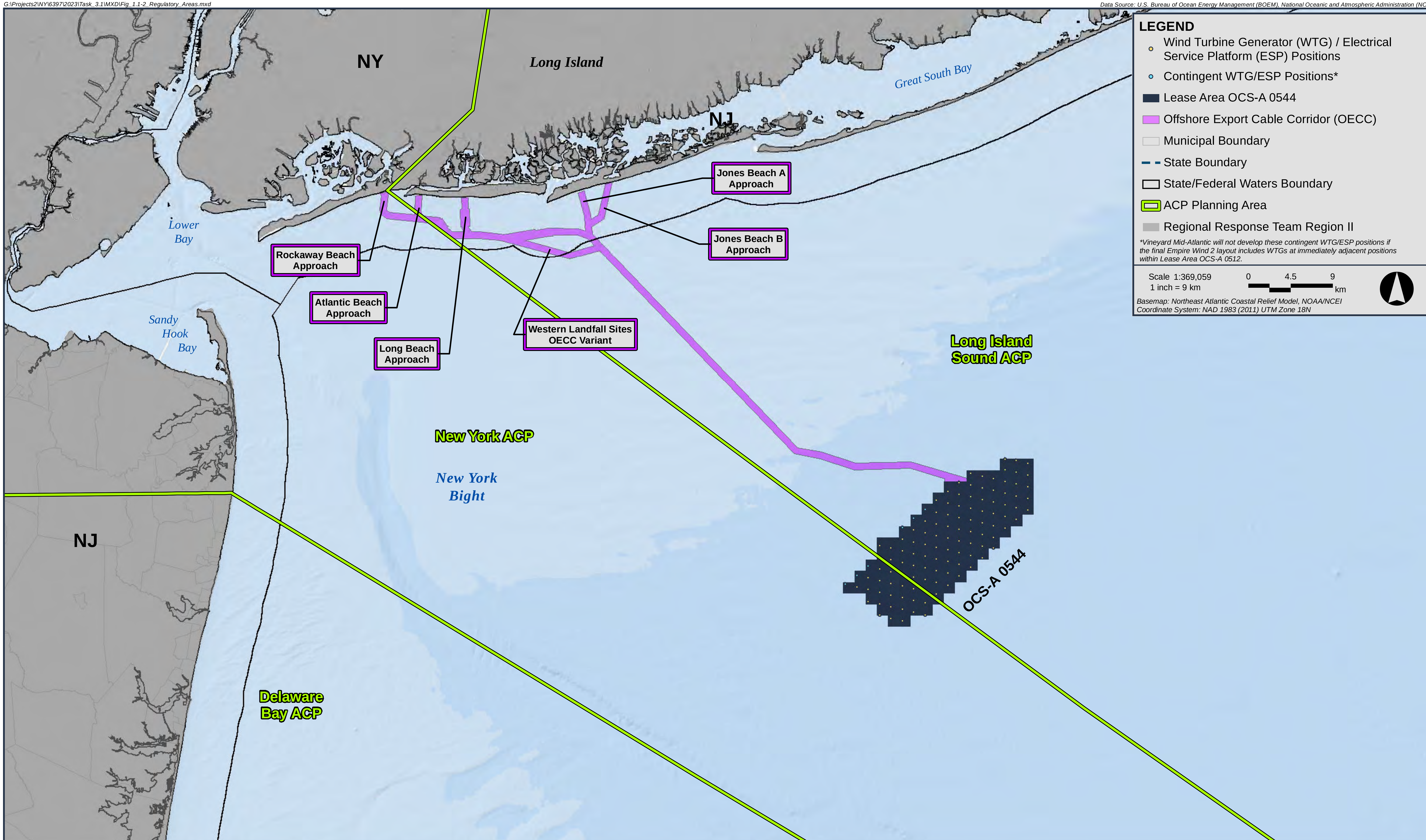

Figure 1.1-2

Federal Regulatory Areas in Relation to the Vineyard Mid-Atlantic OCS-A-0544 Lease Area and OECC

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Data Source: U.S. Bureau of Ocean Energy Management (BOEM), National Oceanic and Atmospheric Administration (NOAA)

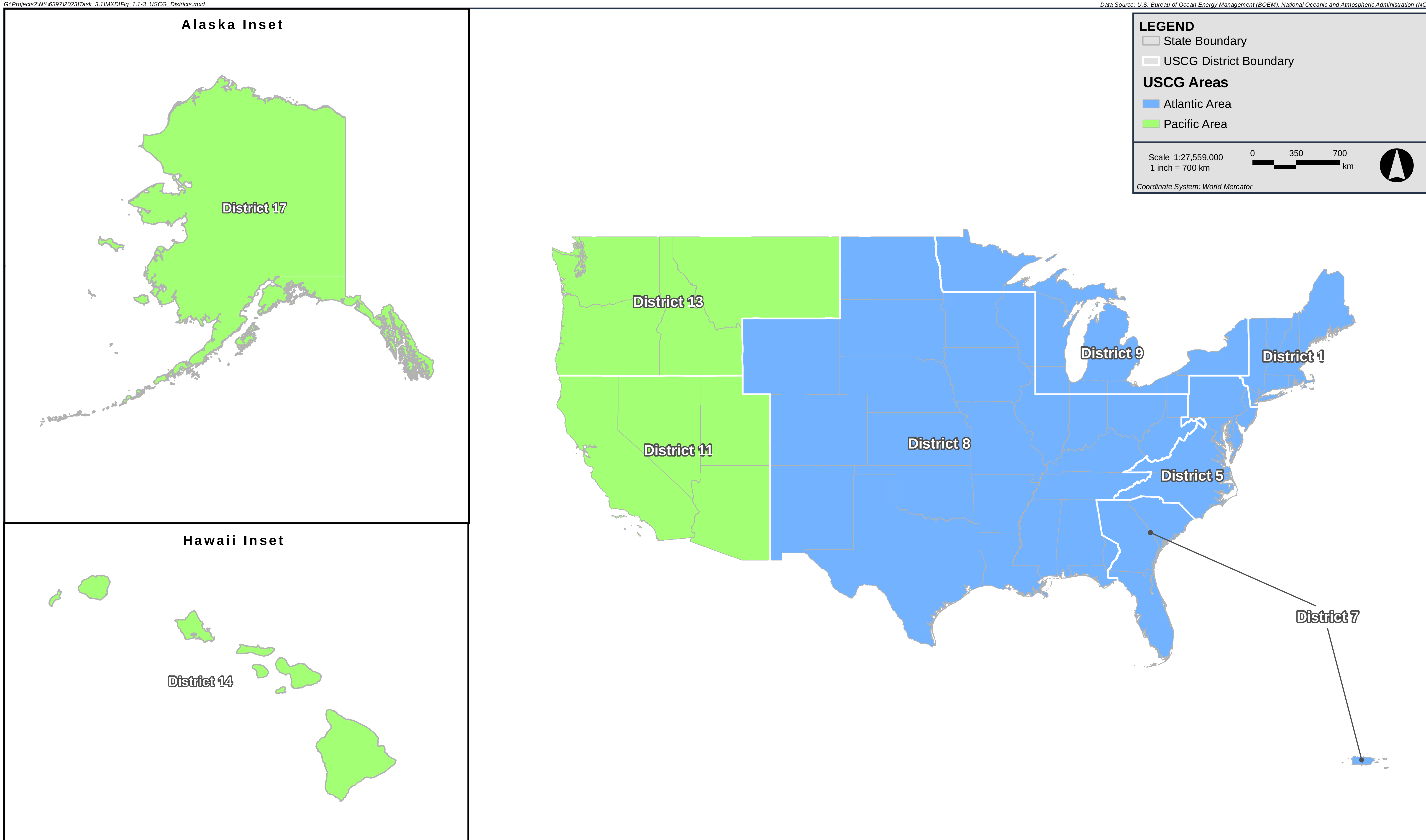

Figure 1.1-3
Location of USCG Districts

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Pursuant to 30 CFR 585.627(c), as part of the requirement to submit an Oil Spill Response Plan (OSRP) in accordance with 30 CFR 254.1, the OSRP should include:

> "An appropriate trajectory analysis specific to the area in which the facility is located. The analysis must identify onshore and offshore areas that a discharge potentially could affect. The trajectory analysis chosen must reflect the maximum distance from the facility that oil could move in a time period that it reasonably could be expected to persist in the environment."

The required oil spill modeling analysis is included as Annex 5 to this OSRP. For an unmitigated worst case oil release from the two representative ESP locations (ESP 1 and ESP 2; Figure 1.1-1), the study showed that there would be a less than or less than or equal to 10% probability that oil above a minimum thickness of 100 µm (0.004 in [100 g/m^2 on average over the grid cell]) would reach the shorelines of Long Island, New York, and mid-to-south New Jersey within 20 days of release for the spring, summer, and fall scenarios, respectively. In the winter scenarios from both ESP 1 and ESP 2 locations, the predicted areas of probability greater than 1% with shoreline oil contamination above a minimum thickness of 100 µm (0.004 in [100 g/m^2 on average over the grid cell]) were contained to the New Jersy coast and were predicted to hit the shoreline within 7 to 10 days of the release. However, due to the close proximity of Long Island, New York to the Lease Area, Vineyard Mid-Atlantic is prepared to make all appropriate notifications in the event these areas are threatened. It is important to note the oil spill scenarios that were modeled (as provided in Annex 5) assume no oil spill response or mitigation would occur, which is a very conservative assumption and would not happen in practice. In the event of a spill, response equipment employed on water would be used to prevent the spread of a spill; contain the oil to as small an area as possible; and protect sensitive areas before they are affected. During an incident that impacts more than one region, a lead RRT would be agreed upon to provide guidance. For a response impacting these additional areas, the FOSCs from the appropriate Coast Guard Sectors could be involved in the response with the USCG Sector Long Island FOSC as the lead.

The OSRP is consistent with the RCPs and ACPs as it provides a method and process for communication, coordination, containment, removal, and mitigation of pollution and other emergencies. The specific guidelines presented in this plan have been carefully thought out, prepared in accordance with safe practices, and are intended to prepare personnel to respond to oil spills and other environmental emergencies. Vineyard Mid-Atlantic commits to provide and coordinate the necessary resources to implement this plan.

Specifically, this OSRP:

- Identifies the QIs or Person in Charge having full authority to implement this response plan;
- Requires immediate communication with the appropriate federal, state, and local officials, and entities/persons providing personnel and equipment;

- Identifies, and ensures by contract or other means, the availability of personnel and equipment necessary to remove a worst-case discharge and mitigate or prevent a substantial threat of such a discharge; noting that the specific OSROs need to be selected; and
- Describes training, equipment testing, periodic unannounced drills, and response actions.

1.2 Plan Review and Revision

This OSRP will be reviewed at least every three years from its effective date. It is important to note that this is a living document that will be updated as project details change. Documentation of this review will be provided in the Review Table presented at the front of this OSRP. If the review does not result in modifications to the OSRP, the Chief of BSEE Oil Spill Preparedness Division (Chief of Oil Spill Preparedness Division [OSPD]) or designee will be notified in writing that there are no changes.

The OSRP will be modified and submitted to the Chief of OSPD for approval within 15 days when the following occurs:

- A change occurs which significantly reduces response capabilities;
- A significant change occurs in the worst case discharge scenario or in the type of oil being handled, stored, or transported at the facility;
- A change in the name(s) or capabilities of the OSROs cited in the OSRP;
- A significant change to the ACP(s) for the region; or
- The Chief of OSPD requires that the OSRP be resubmitted if it becomes outdated, numerous revisions make its use difficult, or if the OSRP contains significant inadequacies.

2 Emergency Response Plan

2.1 Oil Spill Detection, Notifications, and Initial Response

Detection of a spill or emergency is the first step in a response. There are several methods by which an emergency situation at the Lease Area may be discovered including the following:

- Reported by company personnel;
- Abnormal operating conditions observed by operator; or
- Reported by private citizens or by public officials.

In every case, it is important to collect accurate information and immediately notify the On-Duty Supervisor and any affected area personnel. Initial response will take place as indicated in Table 2.1-1. The Initial Notification Data Sheet Form (Annex 2) will be completed by the On-Duty Supervisor while discussing the incident when it is initially reported by the person detecting the spill/discharge. Information not immediately known may be added to the form as it becomes available.

The On-Duty Supervisor will notify the QI or AQI upon receiving notification of an emergency event. The QI, AQI, or designee will make notifications as discussed in Section 2.2 to federal, state, and local agencies (Table 2.2-1 and Table 2.2-2) immediately and shall assure that all required documentation is kept.

When making the initial notifications to the On-Duty Supervisor and affected personnel, one should attempt to provide the following information:

- Name of caller and callback number;
- Exact location and nature of the incident (e.g., fire, oil spill);
- Time of incident;
- Name and quantity of material(s) involved, or to the extent known;
- The extent of personal injuries, damage and/or fire, if any;
- The possible hazards to human health, or the environment, outside the facility;
- Body of water or area affected;
- Quantity in water (size and color of slick or sheen) or amount discharged to the land or atmosphere;

- Present weather conditions–wind speed and direction, movement of slick or sheen, current/tide;
- Potential for fire; and
- Action being taken to control the discharge.

A log will be maintained documenting the history of the events and communications that occur during the response (see Annex 2). It is important to remember that the log may become instrumental in legal proceedings, therefore:

- Record only facts, do not speculate.
- Do not criticize the efforts and/or methods of other people/operations.
- Do not speculate on the cause of the spill.
- If an error is made in an entry, do not erase; draw a line through it, add the correct entry above or below it and initial the change.
- Always evaluate safety throughout the response actions.

Table 2.1-1 Initial Response Checklist

Action	Comments
First Person on Scene	
Take personal protective measures and/or distance.	
Identify and control source if possible (close valve, turn off pump, blind the flange). Eliminate ignition sources.	
Notify the On-Duty Supervisor.	
Notify the affected personnel of the incident.	
Warn personnel in the area and enforce safety and security measures.	
If possible, implement countermeasures to control the emergency. If personal health and safety is not assured, do not attempt to reenter the emergency site.	
Designate a Staging Area where the Emergency Response personnel and equipment can safely report to without becoming directly exposed to the spilled product (until QI arrives).	
On-Duty Supervisor	
Activate local alarms and evacuate non-essential personnel.	
Notify QI.	
Initiate defensive countermeasures and safety systems to control the emergency (booms, sorbent material, loose dirt, sandbags, or other available materials). Eliminate ignition sources.	
Initiate Emergency Response notification system.	
Dispatch response resources as needed.	
Monitor and or facilitate emergency communications until QI arrives.	
Keep the public a safe distance from the spill.	

Table 2.1-1 Initial Response Checklist (Continued)

Action	Comments
Qualified Individual (QI) or Designee	
Notify federal, state, and local agencies and other external stakeholders.	
Establish On-Scene Command and an Incident Command Post.	
Assess situation and classify incident.	
Perform air monitoring surveys prior to entering the operational area.	
Determine extent and movement of the spill.	
Identify sensitive areas and determine protection priorities.	
Request additional or specialized response resources.	
Establish Isolation Zones (Hot, Warm, Cold) and Direct On-Scene Response Operations.	
Keep the public a safe distance from the spill.	
Form Unified Command with the USCG, Federal On-Scene Coordinator (FOSC) and State On Scene Coordinator (SOSC). Direct operations until relieved by Incident Management Team's Incident Commander, Owner's Representative, or the incident response is complete.	

2.2 When to Notify

When there is a discharge of oil, a substantial threat of a discharge of oil, or a sheen observed in or in close proximity outside the Lease Area, the notifications described in Sections 2.2.1 and 2.2.2 must be made.

2.2.1 Internal Notifications

The individual who discovers the spill will call the On-Duty Supervisor immediately and report initial facts about the incident. The On-Duty Supervisor will record the facts (see forms in Annex 2) and immediately (within 15 minutes) notify the QI. Table 2.2-1 lists the various key personnel and their 24-hour contact information. The QI or designated alternate on duty will be available 24-hours per day and capable of arriving to Vineyard Mid-Atlantic's facility to establish the initial incident command and begin coordinating a response within a reasonable amount of time after contacting. A Spill Response Coordinator and Alternate Spill Response Coordinator will also be available to assist in the oil spill response effort. The Spill Response Coordinators will be members of a Spill Management Team (SMT) that will be available to mobilize to the incident 24 hours a day, 7 days a week. This SMT will staff an incident response organization set up in a standard National Incident Management System Incident Command System organization with appropriate positions activated, as needed. A Spill Response Operating Team will also be available on a 24-hour basis to deploy and operate spill-response equipment at the Lease Area.

Other than the Spill Response Operating Team, the Vineyard Mid-Atlantic response personnel listed in Table 2.2-1 will manage any incident from the O&M facility, which will act as the Spill-Response Operations Center, and will include provisions for primary and alternate communications systems available for use in coordinating and directing spill-response operations.

Table 2.2-1 Vineyard Mid-Atlantic Internal Notification List

Name	Position	Cell	Email
Rachel Pachter	Qualified Individual, Vineyard Mid-Atlantic	+1 (508) 680-6455	rpachter@vineyardoffshore.com
Jennifer Simon Lento	Alternate Qualified Individual, Vineyard Mid-Atlantic	+1 (215) 485-8580	jsimonlento@vineyardoffshore.com
Ian Campbell	Spill Response Coordinator, Vineyard Mid-Atlantic	+1 (781) 983-8943	icampbell@vineyardoffshore.com
Person D	Alternate Spill Response Coordinator, Vineyard Mid-Atlantic	(XXX) XXX-XXXX	XXX@XXX.com
Persons E-Z	Other Spill Management Team Members, Vineyard Mid-Atlantic	(XXX) XXX-XXXX	XXX@XXX.com

2.2.2 External Notifications

Any person or organization responsible for an oil spill is required to notify the federal government when the amount reaches a federally-determined limit. This federally-determined limit is based on the "Discharge of Oil" regulation. The Discharge of Oil regulation is more commonly known as the "sheen rule." Under the Clean Water Act, this rule provides the framework for determining whether an oil spill should be reported to the federal government. In particular, the regulation requires the person in charge of a facility or vessel responsible for discharging oil that may be "harmful to the public health or welfare" to report the spill to the federal government. The regulation establishes the criteria for determining whether an oil spill may be harmful to public health or welfare, thereby triggering the reporting requirements, as follows:

- Discharges that cause a sheen or discoloration on the surface of a body of water;
- Discharges that violate applicable water quality standards; and
- Discharges that cause a sludge or emulsion to be deposited beneath the surface of the water or on adjoining shorelines.

Anyone who discovers an oil spill meeting any of the above criteria must contact the National Response Center (NRC) at (800) 424-8802 as soon as knowledgeable of the spill. Notifying the NRC meets all federal reporting requirements, including reporting requirements to USCG, BSEE, and BOEM. The Proponent will provide the following information if it is known:

- Name, location, organization, and telephone number
- Name and address of the party responsible for the incident; or name of the carrier or vessel, the railcar/truck number, or other identifying information
- Date and time of the incident
- Location of the incident
- Source and cause of the spill
- Types of material(s) spilled
- Quantity of materials spilled
- Medium (e.g., land, water) affected by spill
- Danger or threat posed by the spill
- Number and types of injuries or fatalities (if any)
- Weather conditions at the incident location
- Whether an evacuation has occurred
- Other agencies notified or about to be notified
- Any other information that may help emergency personnel respond to the incident

Once contacted, the NRC Duty Officer will guide the caller through a detailed series of questions based on the Standard Report Form to gather as much information as possible concerning the spill. The information is immediately entered into the Incident Reporting Information System (IRIS) and based on several pre-established criteria including material involved, mode of transportation, injuries, damage, and fatalities, select federal agency notification will take place within 15 minutes of receipt.

Several steps are followed for initial determination of external notifications, as outlined herein. **Initial calls to the New York State Department of Environmental Conservation (NYSDEC), the Connecticut Department of Energy and Environmental Protection (CT DEEP), the New Jersey Department of Environmental Protection (NJDEP), the Rhode Island Department**

of Environmental Management (RIDEM), the Massachusetts Department of Environmental Protection (MassDEP), the Delaware Department of Natural Resources and Environmental Control (DE DNREC), the Maryland Department of Environment (MDE), and the Virginia Department of Environmental Quality (VA DEQ) will be made within two hours of discovery of a spill of more than 10 gallons (0.2 bbl) of gasoline or oil on land within a 24-hour period or a spill of any quantity of gasoline or oil that creates a sheen on a surface water body.

Vineyard Mid-Atlantic will also notify the New York State Historic Preservation Officer (SHPO) in the event that sensitive historic and prehistoric resources could be impacted by the spill. The SHPO will evaluate areas where response actions are to be conducted for potential impact to historic and culturally sensitive sites.

Additional Notifications

The QI, AQI, or designee will make all initial and follow-up federal, state, and local agency notifications. Vineyard Mid-Atlantic will use forms provided in Annex 2 to document details of notifications and ensure accurate information is being passed along. Although notification to NRC completes ALL federal agency notification requirements, Vineyard Mid-Atlantic will follow-up directly with the appropriate agencies as needed. Specific phone numbers for initial federal, state, and local response agencies are included in Table 2.2-2. Although not required by regulations, courtesy calls can be placed directly to local offices of federal agencies in order to establish lines of communication, if desired. A complete list of phone numbers for agencies, resources, and stakeholders who may need to be contacted during a particular incident are listed in Annex 1.

The Vineyard Mid-Atlantic contracted OSRO will be notified immediately following any oil spill that cannot be contained on the ESP or WTG. They may initially be placed on standby as more details are being gathered about the spill, or they may be immediately activated to the scene.

There are a number of other contacts that will be made if required, and they may include:

- Emergency medical personnel;
- Occupational Safety & Health Administration (OSHA); and
- Wildlife rehabilitation personnel.

Annex 1 lists initial emergency notifications and provides a complete list of potential response resources, trustees, and federal, state, and local agencies.

Media

In the event the media becomes interested in the oil spill response effort, the Proponent will be prepared to discuss the following:

- An explanation of any injuries or deaths and what safety measures were put in place to mitigate any further injuries/deaths;
- The nature and extent of the economic losses that have occurred or are likely to occur;
- The persons who are likely to incur economic losses;
- The geographical area that is affected or is likely to be affected;
- The most effective method of reasonably notifying potential claimants of the designated source; and
- Any relevant information or recommendations.

Table 2.2-2 Initial Agency Notifications

Agency	Phone	Requirements for Notifications
Federal Agencies		
National Response Center (NRC)	(800) 424-8802 (serves to notify all federal agencies)	Immediate notification is required for all discharges of oil sufficient to produce a sheen on navigable waters of the United States. Spills of dielectric insulating fluid or other synthetic oil may not produce a sheen capable of being detected visually. Known spills of these fluids must also be reported to the NRC immediately.
EPA Region 1	(888) 372-7341 or (617) 918-1111	NRC will notify EPA for all oil discharges into inland navigable waters of the United States sufficient to create a sheen. A written report is not required.
USCG Sector Long Island Sound	(203) 468-4401	Vineyard Mid-Atlantic should notify USCG Long Island Sound if the spill is predicted to threaten Connecticut.
USCG Sector New York	(718)-354-4121	Vineyard Mid-Atlantic should notify USCG New York if the spill is predicted to threaten New York.
USCG Sector Southeastern New England	(508) 457-3211 or (508) 538-2300	NRC will notify the USCG for all oil discharges into coastal navigable waters of the United States sufficient to create a sheen. A written report is not required. The NRC will also provide details to the USCG Sector if the incident is a "serious marine incident" which is defined as (1) One or more deaths, (2) Injury to a crewmember, passenger, or other person which requires professional medical

Table 2.2-2 Initial Agency Notifications (Continued)

Agency	Phone	Requirements for Notifications
Federal Agencies (Continued)		
		treatment beyond first aid, (3) Damage to property greater than $100,000, (4) Actual or total constructive loss of any vessel, or (5) Discharge of oil of 37,854 liters (10,000 gallons) or more into the navigable waters of the U.S.
USCG Sector Delaware Bay	(215)-271-5952 or (215)-271-4989	Vineyard Mid-Atlantic will notify the Sector Response Department which could include the Response Department Head and/or the Incident Management Division Chief for all oil spills.
BSEE Atlantic OCS Region	(504) 736-0557	Pursuant to 30 CFR 250.187(d) and 30 CFR 254.46(b), Vineyard Mid-Atlantic will notify BSEE without delay for a spill that is one (1) barrel or more or, if the volume is unknown, is thought to be one barrel (1) or more.
BOEM Atlantic OCS Region	1-800-200-4853	Vineyard Mid-Atlantic will directly notify BOEM for a spill on the OCS.
State Agencies		
New York State Department of Environmental Conservation (NYSDEC)	1-800-457-7362 or 1-518 457-7362 for calls outside New York State	Vineyard Mid-Atlantic will notify NYDEC immediately for any spill greater than 19 liters (5 gallons).
New Jersey Department of Environmental Protection (NJDEP)	1-877-927-6337	Vineyard Mid-Atlantic will notify immediately for any medium or major spills and minor spills in pristine waters.
Connecticut Department of Energy and Environmental Protection (CT DEEP)	(860) 424-3338 or (866)-DEP-SPIL	Vineyard Mid-Atlantic will notify CT DEEP immediately for any spill equal to or greater than 5 gallons (0.1 bbl) over a 24 hour period if the spill is predicted to threaten Connecticut.
Rhode Island Department of Environmental Management (RIDEM)	(401) 222-1360	Vineyard Mid-Atlantic will notify the RIDEM Office of Emergency Response immediately for any spill greater than 5 gallons (0.1 bbl).
Massachusetts Department of Environmental Protection (MassDEP)	(888) 304-1133	Immediate notification (less than two hours) is required for all discharges of oil to water resulting in a sheen on the water surface and any spill equal to or greater than 10 gallons (0.2 bbl) on land. In addition, the local fire department should be notified.
Delaware Department of Natural Resources and Environmental Control (DE DNREC)	(800)-662-8802	Vineyard Mid-Atlantic will notify immediately for any medium or major spills and minor spills in pristine waters.

Table 2.2-2 Initial Agency Notifications (Continued)

Agency	Phone	Requirements for Notifications
State Agencies (Continued)		
Maryland Department of the Environment (MDE)	(866)-633-4646	Vineyard Mid-Atlantic will report the incident to DME immediately, but not later than two hours after detection of any spill.
Virgina Department of Environmental Quality (VDEQ)	1-800-468-8892	Emergency Release Notification requirements state that an initial, verbal notification must be made to the Local Emergency Planning Committee (LEPC) of the release location and Virginia Department of Emergency Management (VDEM).
OSRO		
TBD		
Contact information for additional agencies or services that may become involved in an incident is provided in Annex 1.		

2.3 Establishment of a Unified Command

The QI at the facility will initially be the incident commander during any spill. As the incident escalates, personnel from the facility, as well as federal, state, and local agencies, will augment the response forming a Unified Command managed by an interagency Incident Management Team (IMT). The National Incident Management System (NIMS) will be used by the facility, in concert with OSROs and federal, state, and local agencies. An outline of the Incident Command System (ICS) structure is provided in Figure 2.3-1. Because the use of NIMS ICS is mandated for all levels of government by Homeland Security Presidential Directive 5 (HSPD-5), the Proponent will ensure that this flexible system is implemented in the event of an incident. The designated QI or AQI for Vineyard Mid-Atlantic is English-speaking, located in the United States, available on a 24-hour basis, familiar with implementation of this response plan, and trained in their responsibilities under the plan. The QI or designated AQI has full written authority to implement this response plan, including:

- Activating and engaging in contracting with identified oil spill removal organization(s);
- Acting as a liaison with the pre-designated FOSC and SOSC; and
- Obligating, either directly or through prearranged contracts, funds required to carry out all necessary or directed response activities.

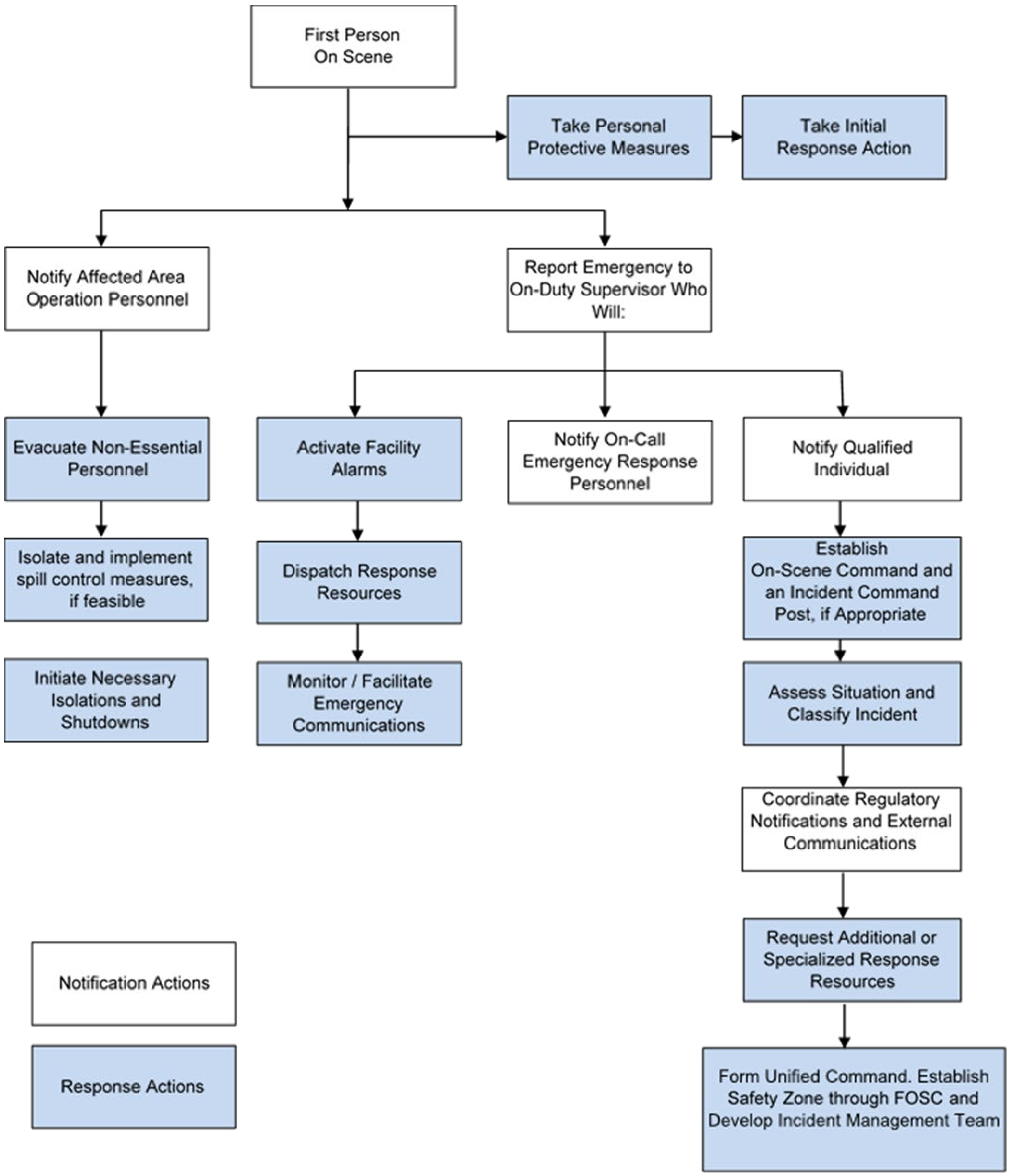

Figure 2.3-1
Initial Response Flowchart

VINEYARD MID-ATLANTIC
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2.4 General Spill Mitigation

Vineyard Mid-Atlantic will ensure that spill containment measures (e.g., offshore-certified dry-break connectors and drip trays) are implemented for any temporary connections transporting oily substances (e.g., between diesel storage container and emergency generator).

All fluids used on the offshore structures are contained on the structure. The WTGs and ESPs are equipped with a secondary containment structure that will be sized according to the largest container. A simple oil spillage kit, sufficient to mitigate small, local spillage during maintenance, will be included during installation of the WTGs.

While design parameters will be put in place to prevent spills, there is still a potential for incidents to occur. In case of an oil discharge, the highest priority is always the safety of the personnel. The mitigation procedures included in this section provide general guidance in responding to an oil spill. Training of the Spill Response Operating Team and onboard drills on all emergency procedures will be provided to mitigate the potential for environmental impact.

Maps of the facility showing spill response equipment storage sites and staging locations to be deployed in the event of a discharge will be provided prior to construction.

For Vineyard Mid-Atlantic, discharge scenarios could occur at any of the different components of the offshore facility where oil is stored. It is important to note that Vineyard Mid-Atlantic's offshore cables do not include fluids, and there is no risk for an oil discharge from the offshore cables. General mitigation procedures by which Vineyard Mid-Atlantic and the listed/contracted OSROs would respond to such discharges are included below. Section 5 of this OSRP contains additional spill mitigation considerations.

1. WTG spill – The largest potential spill from a total loss of a WTG would be 6,604 gallons (157 bbl) with the largest source of oil being 3,963 gallons (94 bbl) of transformer oil (a dielectric or synthetic oil). The WTGs would also contain 660 gallons (16 bbl) of hydraulic oil (a petroleum-based oil). These quantities are relatively small. Sorbents, booms, and other methods that are appropriate for the type of oil spilled may be used to recover as much oil as possible (see Section 2.5). However, these small quantities of oil will quickly weather in the environment and will likely not impact the shoreline.

2. ESP spill – The largest potential spill from a total loss of an ESP would be 337,969 gallons (8,047 bbl). The largest source of oil in the ESPs would be the naphthenic oils in the power transformers, auxiliary/earthing transformers, and reactors, which total 308,025 gallons (7,334 bbl) per ESP. Overall, the oil mixture discharged from the loss of an entire ESP would be a combination of naphthenic oil, mineral oil, biodegradable oil, and diesel, with the majority of this mixture dominated by the naphthenic oil. For the trajectory analysis conducted at Vineyard Mid-Atlantic, there is an equal to or less than a 10% probability that oil would reach the shoreline during any season. In addition, this

modeling did not consider response actions and thus is highly conservative. In any spill scenario, after securing the source, containing the oil on scene as soon as possible would be the most important response action to take. Oil Spill Recovery Vessels (OSRVs) will immediately be mobilized to the scene to recover the oil. The majority of the oil mixture contained in the ESPs is a dielectric or synthetic oil, which require different techniques for detection and response than petroleum oils. Containment and recovery methods for different oil types are detailed further in Section 2.5. Dispersant and in-situ burning should also be considered. These response measures are explained in detail in Sections 2.7 and 2.8, respectively. Smaller spills of the individual oils stored on the ESP must also be considered. The naphthenic oil would be more persistent in the environment than diesel oil, which would more readily evaporate.

2.4.1 Preliminary Assessment

To identify whether a spill from a WTG or ESP has occurred, it is anticipated that the first indicator will be the detection of a spill via camera or a fluid level gauge/low fluid level indicator. Another sign of a discharge may be the creation of a visible sheen on the water's surface or a spill into secondary containment.

Following the protection of the safety of responders and the public, taking action to secure the source of the spill is the main priority. After initial response is taken to secure the source of the spill, and notifications are made to the required agencies, further spill containment, recovery, and disposal operations can begin. It is important to first identify the magnitude of the problem and resources threatened. The QI or designee will:

1. Classify the type and size of spill.
2. Determine chemical and physical properties of spilled material for potential hazards (see Annex 4, Safety Data Sheets [SDSs]). Ensure that cleanup techniques and procedures selected are appropriate for the type of oil spilled.
3. Obtain on-scene weather forecast such as wind speed, wind direction, and tide schedules (12, 24, 48, and 72-hour).
4. Track oil movement or projected movement. Consider the need for overflights and possible challenges in visually detecting spills of dielectric insulating fluid or synthetic oil.
5. Continuously assess human health and environmental concerns based on the type of oil spilled.
6. Determine extent of contamination and resources threatened (i.e., waterways, wildlife areas, economic areas).
7. Start chronological log of the incident.

As part of this Preliminary Assessment, Vineyard Mid-Atlantic will classify the incident to quickly categorize the appropriate level of response, notifications, and resources that may be necessary to mitigate the emergency. The incident will be categorized based upon the nature of the incident, degree of containment and isolation, materials involved or size of the spill, and any other additional information provided by the person reporting the spill. Incident levels may be upgraded or downgraded from the initial determination as further information is determined or the situation changes. The Incident Classification levels are presented in Table 2.4-1. A Level One incident will require only the mobilization of Vineyard Mid-Atlantic personnel.

Based on the preliminary assessment, additional cleanup personnel and equipment will be dispatched to the site and deployed to control and contain the spill.

Table 2.4-1 Guidelines for Determining Incident Classification

Level	Guidelines
Level One	Minimal danger to life and property and the environment. Project personnel are capable of responding to the incident. The problem is limited to the immediate work area or spill site and spills are generally less than 208 liters (55 gallons).
Level Two	Serious situation or moderate danger to life, property, and the environment. The problem is currently limited to the Lease Area, but it does have the potential for either involving additional exposures or migrating offsite. The incident could involve a large spill of oil, a fire, and loss of electrical power.
Level Three	Crisis situation or extreme danger to life, property, and the environment. The problem cannot be brought under control, goes beyond the Lease Area, and/or can impact public health and safety, and the environment, or a large geographic area of an indefinite period of time. Such incidents include a vessel fire or discharge of oil in a volume that can impact surrounding areas.

2.4.2 Establishment of Objectives and Priorities

Emergency conditions will be managed in a controlled manner, and oil spill response operations will be conducted with the following objectives:

- Provide for the safety and security of responders and maximize the protection of public health and welfare.
- Initiate actions to stop or control the source, and minimize the total volume discharged.
- Determine oil fate and trajectories.
- Contain, treat, and recover spilled materials from the water's surface using techniques appropriate for the type of oil spilled.
- Conduct an assessment and initiate shoreline cleanup efforts appropriate for the type of oil spilled.

- Identify and protect sensitive sites, including wildlife, habitats, and historic properties. Develop strategies for protection and conduct pre-impact shoreline debris removal.

- Identify threatened species and prepare to recover and rehabilitate injured wildlife.

- Investigate the potential for and, if feasible, use alternative technologies to support response efforts.

- Establish and continue enforcement of safety and security zones.

- Manage a coordinated interagency response effort that reflects the composition of the Unified Command.

- Inform the public, stakeholders, and the media of response activities.

During a major oil spill, resources, time, and various response constraints may limit the extent of areas that can be immediately protected. Every attempt should be made to prevent impacts to areas surrounding a spill site.

Vineyard Mid-Atlantic is located in the OCS. Long Island, which is the closest land mass, is located approximately 38 km (24 mi) north of the Lease Area. (The closest WTG/ESP position within the Lease Area is approximately 38 km [24 mi] from Fire Island, NY.) Resources of special economic or environmental importance located on Long Island include:

- National Historic Landmarks of Montauk Point Lighthouse and the 1888 Oyster Sloop Priscilla

- Public drinking water well and distribution systems;

- Fire Island National Seashore

- Robert Moses State Park, Jones Beach State Park, Gilgo State Park, Captree State Park, Heckscher State Park, Napeague State Park, Hither Hills State Park, Montauk Point State Park, Gateway National Recreation Area; and

- Amagansett and Wertheim National Wildlife Refuges.

Environmental Sensitivity Index (ESI) maps, available from the National Oceanic and Atmospheric Administration (NOAA), provide a summary of coastal resources that are at risk if an oil spill occurs in the area. Maps with coverage of South Long Island would be contained in New York and New Jersey: Grid Tiles 1A through 10C. The maps are available in pdf format at: https://response.restoration.noaa.gov/maps-and-spatial-data/download-esi-maps-and-gis-data.html.

2.4.3 Implementation of Tactical Plan

The general procedures for implementation of a tactical plan are likely to include:

- Maximize protection of response personnel.
- Deploy containment resources, and, if appropriate, divert spill to a suitable collection point that is accessible and causes the least impact to surrounding areas.
- Boom off sensitive areas.
- Maximize on-water containment and recovery operations.
- Handle wastes to minimize secondary environmental impacts.

Vineyard Mid-Atlantic will establish contractual agreements with an OSRO to conduct oil spill response operations. Facility personnel will use containment equipment available at the site to surround or divert the spill until the OSRO arrives on scene. If the spill is large enough to require a Unified Command and Incident Management Team, the Incident Action Planning cycle will begin and will establish incident objectives, strategies, and tactics. The Unified Command would likely be made up of the USCG Sector Long Island Sound FOSC, the NYSDEC OSC, and the Vineyard Mid-Atlantic Incident Commander.

2.4.4 Sustained Actions

"Sustained" action is a term regularly used in oil spill response to capture the ongoing response once the initial emergency response phase is complete. This phase includes establishing an incident management organization, procuring response and support resources, implementing security measures at the ICS facilities, establishing oil waste decontamination and disposal procedures, and initiating public relations outreach.

The Unified Command will manage response operations 24 hours a day, seven days a week, until the operation is complete. Vineyard Mid-Atlantic's IMT will cascade in to support response operations when necessary. Once the initial emergency stage of the spill situation transitions to the sustained action stage, the response management structure will also transition to prolonged mitigation and/or recovery action strategies.

The WTGs and ESPs are equipped with secondary containment, which reduces the potential need for a sustained action. Most incidents would be handled by a few individuals without implementing an extensive response management system and would not continue into this sustained action phase.

2.4.5 Termination and Follow-Up Actions

Cleanup will be conducted as thoroughly as possible, but will be terminated when, in the opinion of the FOSC and the QI/Vineyard Mid-Atlantic Incident Commander:

- There is no recoverable oil in the water;
- Further removal actions would cause more environmental harm than the remaining oil;
- Cleanup measures would be excessive in view of their insignificant contribution to minimizing a threat to the public health, welfare, or the environment; and
- Actions required to repair unavoidable damage resulting from removal activities have been completed.

Once the determination has been made that the response can be terminated, certain regulations may become effective once the "emergency" is declared over. Orderly demobilization of response resources will need to occur. Follow-up actions such as accident investigation, response critique, plan review, and written follow-up reports will be needed.

The Vineyard Mid-Atlantic IMT Planning Section will develop a Demobilization Plan to ensure that an orderly, safe, and cost-effective demobilization of personnel and equipment is accomplished. General considerations for the Demobilization Plan include ensuring that comprehensive check-out procedures are developed, that a process for equipment return is included, and that all personnel return to their home location safely.

Resources will be demobilized in accordance with priorities and procedures set by the Unified Command/Incident Command. As the response transitions from the emergency response phase to a planned recovery effort, the demobilization of incident resources must be conducted in an efficient and safe manner and shall not interfere with ongoing incident operations.

The Unified Command/Vineyard Mid-Atlantic Incident Commander will approve the demobilization of critical resources identified by command staff prior to demobilization from the incident. Those resources will be identified daily in the daily operational period planning cycle. All demobilizations from the incident will be initiated by the Planning Section's Demobilization Unit after Unified Command/Incident Commander approval.

In accordance with 30 CFR 254.56(b), Vineyard Mid-Atlantic will file a written follow-up report for any spill from the facility of 1 barrel or more to the Chief of OSPD within 15 days after the spillage is secured. All reports will include the cause, location, volume, and remedial action taken. Reports of spills of more than 50 barrels will include information on the sea state, meteorological conditions, and the size and appearance of the slick. Vineyard Mid-Atlantic will provide additional information to the BSEE Regional Supervisor if it is determined that an analysis of the response is necessary.

2.5 Response Strategies for Containment, Recovery, and Protection of Sensitive Sites

The WTGs and ESPs will be located in the OCS. Offshore export cables will transport power from the ESPs to two new onshore substations in Queens, Nassau County and/or Suffolk County, New York. Grid interconnection cables will connect the new onshore substations to the existing East Garden City Substation (Uniondale) Point of Interconnection (POI) in Uniondale, New York and the Ruland Road Substation POI in Melville, New York. Details regarding the onshore export cable routes, onshore substation sites, and grid interconnection routes are presented in COP Volume I. The Proponent will develop a Spill Prevention, Control, and Countermeasure (SPCC) Plan for each onshore substation site as part of the state permitting process, which will describe onshore spill prevention and response procedures. Thus, onshore discharges are not addressed in this OSRP.

Containment and recovery refer to techniques that can be employed to contain and recover onshore and aquatic petroleum spills. Responses on water should therefore emphasize stopping the spill, containing the oil near its source, and protecting sensitive areas before they are impacted. The objective of the initial phase of the containment procedure prevents the spread of the spill, especially on water, and confines it to as small an area as possible. The containment goals are to prevent liquid or vapors from reaching a possible ignition source (i.e., boat engines, electrical equipment) and any environmentally sensitive area (i.e., water, wetland, wildlife management area).

The primary methods to be used in containing a discharge would be sorbent boom or pads, if available, or containment boom, if the oil reaches water. It may be necessary to use several methods in one spill. Sorbents can be used to remove minor on-water spills and spills on the WTGs and ESPs. Traditional polyethylene sorbents are best used for petroleum-based oils, such as the hydraulic oil in the WTG or the diesel oil in the ESP. Sorbent boom or pads made of natural fiber (e.g., coconut husk) can be more effective to cleanup spills of dielectric fluids/synthetic oils, such as the naphthenic or ester oils in the WTGs and/or ESPs. In addition, floating barriers or other mechanical means can be used to contain the oil. Once contained, skimmers can collect these oils in order to remove them from the environment. Drum and disk skimmers work best for removing spills of dielectric fluids/synthetic oils.

For larger spills, Vineyard Mid-Atlantic will use mechanical recovery as the first response measure following an oil spill. These operations will include removing oil using advancing and stationary recovery systems. OSRVs will be mobilized by the OSRO to remove fresh oil from the water’s surface. Adequate storage for recovered oily water will be available to ensure skimming operations can continue. Storage on-board vessels, as well as storage bladders and tanks, may be used to extend the recovery operations. To protect shorelines from any oil, booming strategies from the applicable ACP’s Geographic Response Strategies (GRS) will be employed to divert, deflect, and exclude oil from impacting particularly sensitive areas. The GRS booming strategies developed by the respective Area Committees are shown in Figure 2.5-1.

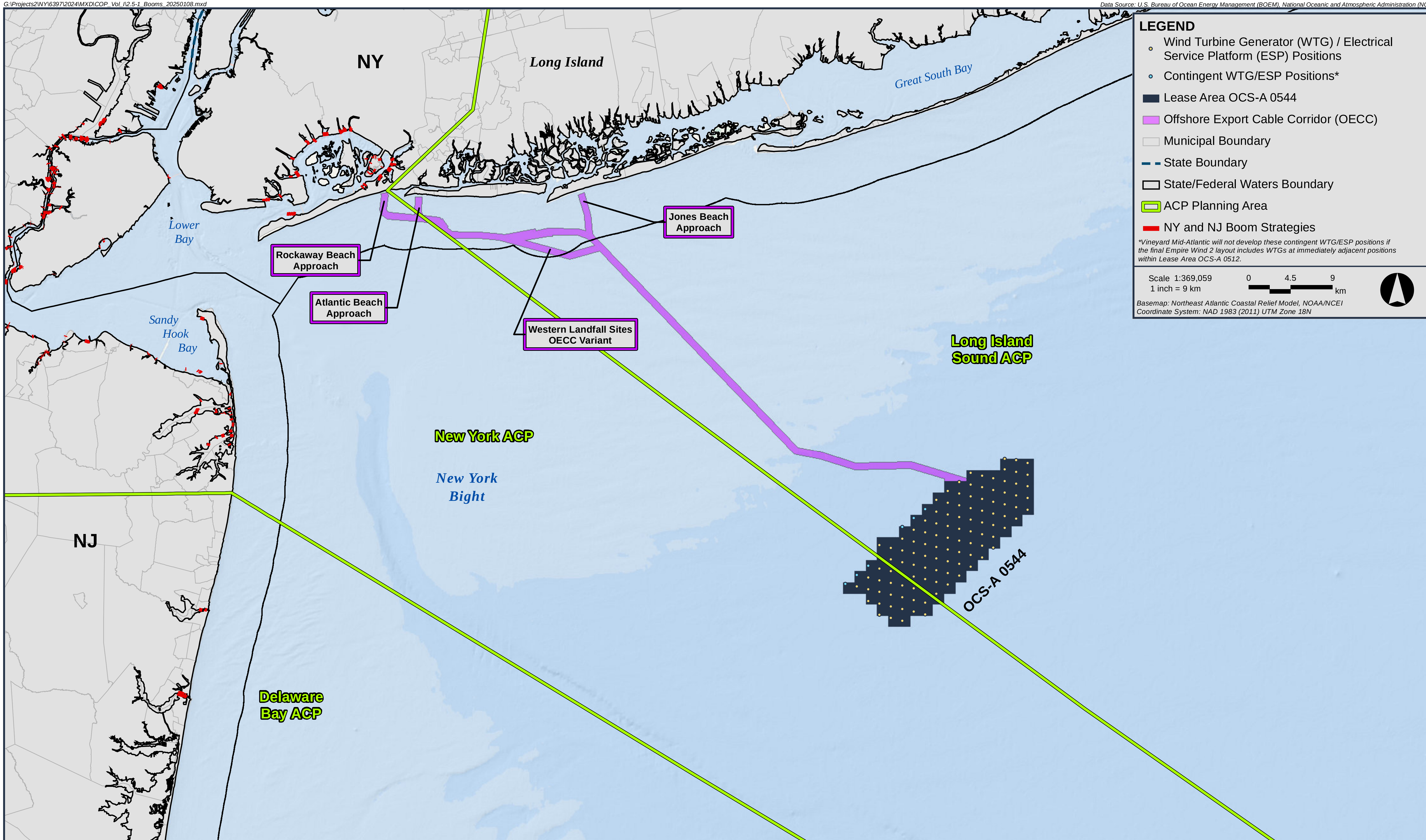

Figure 2.5-1

Booming Strategies in Relation to the Vineyard Mid-Atlantic OCS-A-0544 Lease Area and OECC

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Containment booming will be used to protect sensitive areas and to position oil so it can be removed with skimmers or vacuum trucks (in the unlikely event oil reaches the shoreline). Due to entrainment, booming is not effective when the water moves faster than one knot, or the waves exceed 0.46 meters (m) (1.5 feet [ft]) in height. Angling a boom will minimize entrainment. Using multiple parallel booms will also improve recovery in adverse conditions. A summary of booming techniques is provided in Table 2.5-1.

Table 2.5-1 Booming Techniques

Type of Boom	Use of Boom
Containment Booming	Boom is deployed around free oil. Boom may be anchored or left to move with the oil.
Diversion Booming	Boom is deployed at an angle to the approaching oil. Oil is diverted to a less sensitive area. Anchor points may cause minor disturbances to the environment.
Exclusion Booming	Boom deployed to protect a sensitive area by preventing oil from entering that area

2.5.1 Atlantic Ocean

Oils stored in the WTGs and ESPs have a specific gravity of less than 1.0 and would float on the surface of the water. Feasible protection methods include skimming, booming, and improvised barriers. Sorbent boom should not be used in wide, open ocean environments, unless the oil is in close proximity to an offshore structure. As described previously, large spills in open waters can instead be contained with floating barriers or other mechanical means and collected using skimming equipment.

2.5.2 Banks

The nearest land mass to the WTGs and ESPs is Fire Island, which is located approximately 38 km (24 mi) south of Vineyard Mid-Atlantic’s offshore facilities. Therefore, it is not anticipated that a discharge of oil would impact the terrain alongside the bed of a river, creek, or stream. However, the following response discussion is made available for planning of such an event.

Vegetated Banks

Oil may penetrate the area and coat plants and ground surfaces. Oil can persist for months. A no-action alternative may be appropriate to minimize environmental impacts. Cleanup is usually unnecessary for light coatings, but heavier accumulations may require sediment surface removal to allow new growth. Low-pressure spraying and neutralization solutions may aid removal.

Sand Beaches

Heavy accumulations of wastes can cover an entire beach surface and subsurface. Oil can penetrate the sand from 0.1 m to 0.6 m (0.5 ft to 2 ft) deep. Organisms living along the beach may be smothered or dangerously contaminated. Fine sand beaches are generally easier to clean. Clean by removing oil above the swash zone after all oil has come ashore. Minimize sand removal to prevent erosion. Soil treatment may be possible as well.

Muddy Beaches

Mud habitats are characterized by a substrate composed predominantly of silt and clay sediments, although they may be mixed with varying amounts of sand or gravel. The sediments are mostly water saturated and have low bearing strength. In general, mud shorelines have a low gradient. These fine-grained habitats often are associated with wetlands. Mud habitats are highly sensitive to oil spills and subsequent response activities. Response methods may be hampered by limited access, wide areas of shallow water, fringing vegetation and soft substrate. Natural recovery is typically the best response action for light crude. Vacuum trucks may be used to remove pooled oil on the surface if accessible. Avoid digging trenches to collect oil because that can introduce oil deeper into the sediment.

Riprap Structures

Oil contamination may penetrate deeply between the rocks. If left unattended, oil can asphaltize and fauna and flora may be killed. If possible, remove all contaminated debris and use sorbents to remove oil in crevices. The best response may be to remove and replace heavily contaminated riprap to prevent chronic sheening.

Walls/Pier/Barriers and Docks

Mussels, shellfish, and algae are often found attached to structures such as walls, piers, barriers, and docks, which may be constructed of concrete, stone, wood, or metal. Contamination may percolate between joints and coat surfaces. Heavy accumulations will damage or kill the biota. High-pressure spraying may remove oil and prepare the substrate for recolonization of fauna/flora. The concentration of oil should be considered when making a determination as to whether an action is required to remove contamination from these structures.

2.5.3 Wetlands

The NYSDEC and the National Wetlands Inventory identify wetlands along the entire shoreline of Long Island, and along the coast of New York in such areas as Coney Island and Great Kills Park. Coastal wetlands are also found along the coast of New Jersey in areas such as Sandy Hook and East Long Branch. The DE DNREC and the National Wetlands Inventory identify tidal wetlands along the southeastern coast of Delaware in the Inland Bays watershed. MassDEP's Priority Resource Map and the National Wetlands Inventory identify wetlands on the southern shoreline of Nantucket. Although these resources do not identify any wetland areas along the southern shoreline of Martha's Vineyard, wetlands are located in the vicinity of Allen Point and Cobbs Point in Chilmark, and Swan Neck Point, King Point, and Butler Neck Point in Edgartown. Regions of wetlands are sensitive habitats and must be protected in the unlikely event of an oil spill from Vineyard Mid-Atlantic.

Wetlands are characterized by water, unique soils, and vegetation adapted to wet conditions. Wetlands include a range of habitats such as marshes, bogs, and swamps. The surfaces of wetlands usually have a low gradient, and vegetated areas are typically at, or under, the water level. Wetlands are highly sensitive to oil spills. The biological diversity in these habitats is significant and they provide critical habitat for many types of animals and plants. Oil spills affect both the habitat and the organisms that directly and indirectly rely on the habitat. Wetlands support populations of fish, amphibians, reptiles, birds, and mammals; many species are reliant upon wetlands for reproduction and early life stages when they are most sensitive to oil. Moreover, migratory water birds depend heavily on wetlands as summer breeding locations, migration stopovers, and winter habitats.

For small to moderate spills and lighter oils, natural recovery avoids the damage often associated with cleanup activities. However, the threat of direct oiling of animals using the wetland often drives efforts to remove the oil. Sorbents may be used, but overuse generates excess waste materials. Flooding can be used selectively to remove localized heavy oiling, but it can be difficult to direct water and oil flow towards recovery devices. Pooled oil can be removed by vacuum truck, if accessible, and trampling of vegetation can be avoided. The removal of heavily oiled vegetation may reduce the contamination of wildlife. Time of year is an important consideration for any cleanup method used in a wetland area.

In relation to the wetland areas that have the potential to be impacted by an unlikely worst case and unmitigated oil spill, Annex 5 provides maps of the predicted areas of shoreline probability >1% with oil contamination in excess of the threshold oil thickness of 0.1 mm (0.004 in) and the shortest time required for oil to reach these shorelines. For instance, the oil spill modeling predicts that the wetland areas along Massachusetts and Rhode Island have a very low probability of being reached by oil in ≥5 days following an unmitigated spill, Again, it is important to note the oil spill scenarios that were modeled assume that no oil spill response or mitigation would occur, which is a very conservative assumption and would not happen in practice. In the event of a spill, response equipment employed on water would be used to prevent the spread of a spill; contain the oil to as small an area as possible; and protect sensitive areas before they are affected.

2.5.4 Small Lakes

South Oyster Bay, Great South Bay, Bellport Bay, Narrow Bay, Moriches Bay, and Shinnecock Bay are located along the southern portion of Long Island and New York with direct access to the Atlantic Ocean. It is anticipated that a discharge of oil from the WTGs and ESPs could be contained prior to reaching the navigational channels for the bays and any associated ponds. However, should this occur, the following response discussion is made available for planning of such an event.

Lakes and ponds are standing bodies of water of variable size and water depth. Water levels can fluctuate over time. The bottom sediments close to shore can be soft and muddy, and the surrounding land can include wetlands and marshes. Floating vegetation can be common. Lakes provide valuable habitat for migrating and nesting birds and mammals and support important fisheries. Wind will control the distribution of oil slicks, holding the oil against a shore, or spreading it along the shore and into catchment areas. Wind shifts can completely change the location of oil slicks, contaminating previously clean areas. Thus, early protection of sensitive areas is important. Oil impacts on floating vegetation depend to a large degree on dose, with possible elimination of plants at high doses. The best possible response method is to deploy booms to prevent oil from entering the lakes. If oil does enter any lakes, containing the oil to a small area with booms is the next best response.

2.5.5 Wildlife

Several National Wildlife Refuges located in New York, New Jersey, Delaware, Rhode Island, and Massachusetts could be impacted by a spill from Vineyard Mid-Atlantic. The two National Wildlife Refuges along the southern coast of Long Island are the Amagansett and Wertheim National Wildlife Refuges. These refuges are two of the five properties that are within the Long Island National Wildlife Refuge Complex. The other three wildlife refuges are along the northern side of the island, and it is unlikely to be impacted from any spill at Vineyard Mid-Atlantic. Examples of other National Wildlife Refuges that have the potential to be impacted by an unlikely worst case and unmitigated oil spill include Edwin B Forsythe and Cape May in New Jersey, Block Island in Rhode Island, and Nomans Land Island in Massachusetts.

Because it is illegal to possess wildlife without a permit in New York, Vineyard Mid-Atlantic will ensure any injured, orphaned, or ill wildlife are taken directly to a permitted wildlife rehabilitator. Wildlife rehabilitators licensed by the NYSDEC can be found by county at Special Licenses Search System - New York State Department of Environmental Conservation (ny.gov).

2.6 Waste Disposal and Oil Recovery

Oil spill cleanup from recovery operations will involve the further handling of recovered oil and oiled materials. These will be directed to a state-approved reclamation/disposal site. Normally, the waste generated from a recovery operation will be classified as a non-Resource Conservation & Recovery Act state regulated waste. The EPA tracks the movement of hazardous waste generated and management within the US from “cradle to grave” from when it leaves the place of generation until it gets to the place where it is managed. A uniform hazardous waste manifest (EPA Form 8700-22) is used to track hazardous waste. In rare instances, where it is suspected that extraneous substances have been introduced into a spill, it is appropriate to test the recovered oil for hazardous waste characteristics (ignitability, reactivity, corrosivity, and toxicity).

The different types of wastes generated during response operations require different disposal methods. Waste will be separated by material type for temporary storage prior to transport to an approved recovery or treatment/storage/disposal facility.

Skimmer tanks allow for gravity separation of the oil from the water. The separated water is transferred through a hose and discharged forward of the recovery pump. This method is called "decanting." This process is vital to the efficient mechanical recovery of spilled oil because it allows maximum use of limited storage capacity, thereby increasing recovery operations. Vineyard Mid-Atlantic will obtain approval from federal and state agencies before any decanting is used.

Recovered oil may be transferred to portable tanks. It is important to ensure temporary storage devices are of sufficient size to allow continued operations.

Oily debris collected requires specific handling. Contaminated materials will be placed in leak proof, sealable containers, such as drums or roll-off boxes, and transported to appropriate facilities for processing, recycling, or disposal.

Clean sand and shoreline materials can be separated from oiled materials and returned to the shoreline. Not only is this cost effective from an operations perspective, but it also provides an efficient means of returning clean, excavated material back to the shoreline as a restorative measure.

2.7 Use of Dispersants

Although it is highly unlikely that dispersants will be required for a spill from offshore facilities in Lease Area OCS-A 0544, Vineyard Mid-Atlantic will consider the use of dispersants in any appropriate scenario as an effective means to quickly remove oil from the water's surface and disperse it into the water column. If the Unified Command determines that dispersants could be an effective countermeasure, Vineyard Mid-Atlantic will follow the Dispersant Pre-Authorization Policy contained in the applicable ACP and RCP that are in effect at the time of the spill.

When an OSRO is contracted, Vineyard Mid-Atlantic will update details in this section of the OSRP to include an inventory and location of the dispersants that could be used on the oils handled, stored, or transported; a summary of toxicity data for the dispersants; a description and location of the application equipment required and an estimate of time to begin application after approval is obtained; and the vessel and aerial application procedures.

2.8 Use of In-Situ Burning

Although it is very unlikely in-situ burning will be required for a spill from the facility, Vineyard Mid-Atlantic will consider the use of in-situ burning in any appropriate scenario as another response countermeasure that can be employed to remove oil from the water surface. A controlled burn reduces the oil on the water's surface by releasing the particles into the atmosphere. Spilled oil is contained within a fire boom and ignited using an ignition source. The spilled oil must be approximately 2-3 mm (0.08 in-0.12 in) thick to burn.

According to the American Petroleum Institute, in-situ burning offers a practical method to remove large quantities of oil from the water very quickly. However, there are many limiting factors that should be considered before a burn is conducted. Physical limitations, such as wind speed, wave height, thickness of the oil, oil type, how weathered the oil is, and how emulsified the oil is, will limit the ability to conduct an in-situ burn operation. Environmental impacts that must be considered are human exposure to smoke, monitoring requirements, accessibility to the impacted site, and recovery of burned/unburned product and residue.

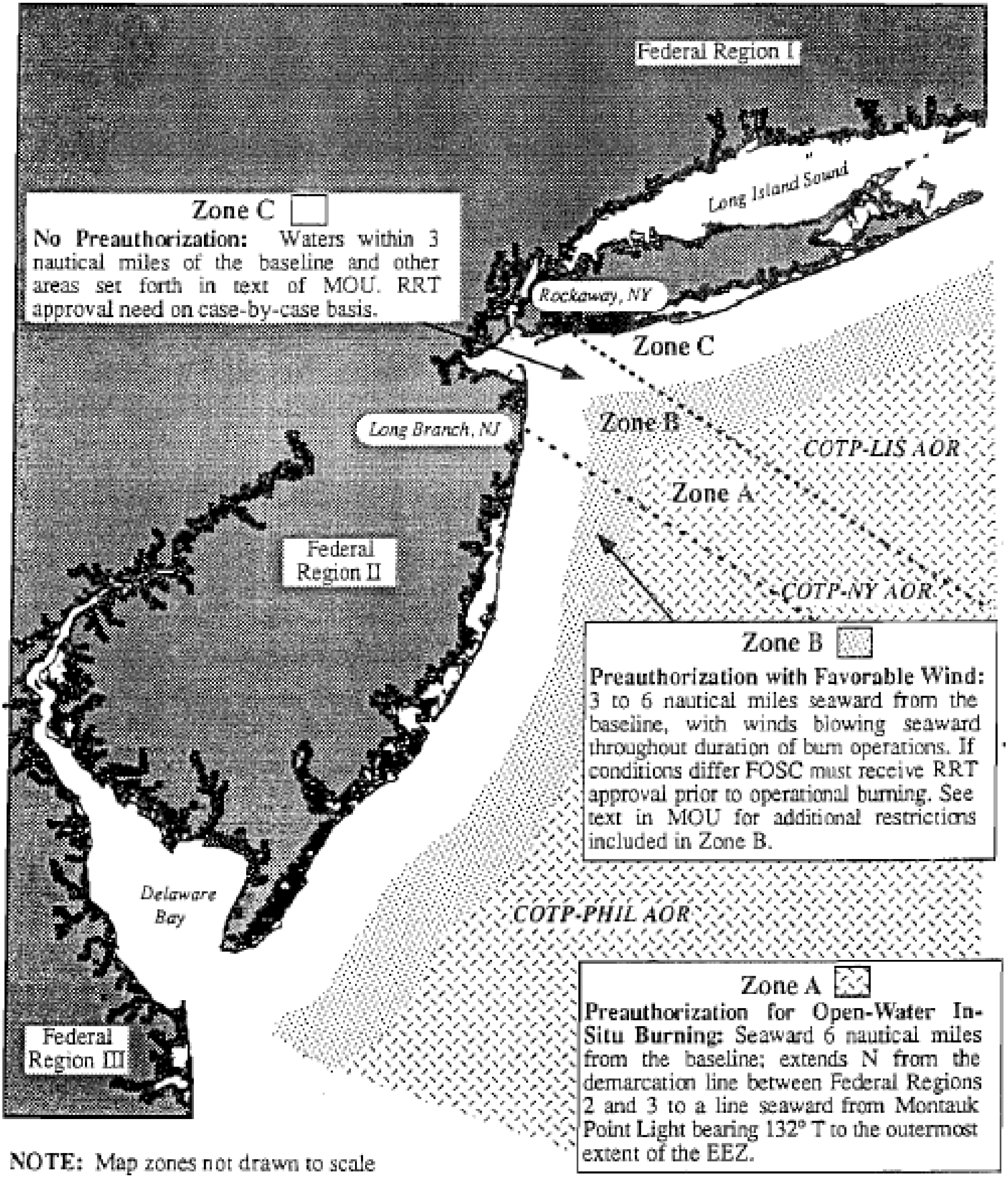
As with dispersant use, the use of in-situ burning can provide a means of oil removal when mechanical recovery cannot be effective or timely.

The Region II RRT developed a Memorandum of Understanding for pre-approval of in-situ burning in certain areas of Region II, breaking Region II into four Zones ("A," "B," "C," and "E"). The Lease Area is located in Zone "A" where open water in-situ burning is authorized. Zone "A" is defined as waters under the jurisdiction of RRT II that lie 6 NM (11.1 km) and seaward of the Territorial Sea Baseline (as defined in 30 CFR 2.05-10) along the coast of New Jersey and the south shore of Long Island, New York. Within Zone "A," the decision to use in-situ burning rests solely with the On Scene Coordinator (OSC). No further concurrence or consultation on the part of the OSC is required with EPA, Department of Commerce (DOC)/NOAA, DOI, or the states of New York or New Jersey. However, if threatened or endangered species are present in the burn area, then the trustee agency must be consulted prior to initiating burning operations.

Zone "B" is defined as water under the jurisdiction of RRT II that lie between 3 NM (5.5 km) and 6 NM (11.1 km) from the Territorial Sea Baseline along the coast of New Jersey and the south shore of Long Island, New York. Within Zone "B," the decision to use in-situ burning rests solely on the OSC if and only if the prevailing wind direction is decidedly seaward and is expected to remain in the seaward direction throughout the duration of the planned in-situ burning operations. If this is the case, no further concurrence or consultation on the part of the OECC is required with EPA, DOC/NOAA, DOI, or the states of New York or New Jersey. If the prevailing wind direction is not decidedly seaward, the OSC is required to follow standard consultation and concurrence procedures. In either case, if threatened or endangered species are present in the burn area, then the trustee agency must be consulted prior to initiating burning operations.

The USCG will immediately notify EPA, DOC/NOAA, DOI, and the states of New York and/or New Jersey of a decision to conduct burning within Zones "A" and "B" via each agency's respective RRT representative. In the case of a spill occurring in Zones "A" or "B," the Unified Command would decide whether to use in-situ burning as a response countermeasure. Figure 2.8-1 shows the pre-authorization zones for in-situ burning in Region II.

When an OSRO is contracted, Vineyard Mid-Atlantic will update details in this section of the OSRP to include a description of in-situ burn equipment (including its availability, location, and owner), a description of the in-situ burning procedures (including ignition), and safety guidelines.



Source: US National Response Team 1996. *Figure 1 Memorandum of Understanding concerning Preauthorization of In-situ Burning in Federal Region II.* This figure depicts the In-Situ Burning Authorization Zones for Federal Region II.

Figure 2.8-1
In-Situ Burning Zone Boundaries from the Region II RCP

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3 Equipment Inventory

Details regarding spill response materials, services, equipment, and response vessels for Vineyard Mid-Atlantic's offshore facilities will be confirmed at a later date.

Appendix 2 of the RRT II RCP contains the USCG/EPA Response Jurisdiction Boundary. This document demarcates the boundary between inland and coastal zones for the purpose of pre-designation of on-scene coordinators for pollution response. USCG will be responsible for general agency and incident specific responsibilities under the NCP and ACP.

The Proponent will ensure that its contracted response equipment is maintained in proper operating condition, ensure that all maintenance, modification, and repair records are kept for a minimum of three years, and provide these records to BSEE upon request. The Proponent or the Proponent's OSRO will provide BSEE with physical access to the Proponent's equipment storage depots and perform functional testing of the Proponent's response equipment upon BSEE's request.

3.1 Maintenance Facilities

Vineyard Mid-Atlantic expects to use one or more onshore O&M facilities to support the operation of Vineyard Mid-Atlantic's offshore facilities. These facilities could be located near several possible ports in New York, New Jersey, and Connecticut. See COP Volume 1, Table 4.4-1 for the full list of locations. The O&M facilities may also include offices, a control room, training space for technicians, employee parking, and/or warehouse space for parts and tools. The O&M facilities are expected to include dock space for service operation vessels (SOVs), service accommodation and transfer vessels (SATVs), crew transfer vessels (CTVs), and/or other support vessels.

The O&M facilities would likely be used for dispatching technicians and crew exchange, bunkering, and loading supplies and spare parts onto vessels. The Proponent may also lease space at an airport hangar for aircraft and helicopters used to support operations. Onshore maintenance and repair activities are expected to require minimal use of worker vehicles and construction equipment. Offshore equipment during maintenance and repair activities could include generators, welding equipment, surface preparation equipment (i.e., to remove rust and prepare the surface for coating touch-ups), pressure washers, and other larger offshore construction equipment (e.g., cranes, cable burial tools).

It is anticipated that Vineyard Mid-Atlantic will maintain spill response equipment such as a spill overpack drum, containment bladders, absorbent booms, pigs, socks, and other sorbent materials. In addition, Vineyard Mid-Atlantic will have on-hand personal protective equipment (PPE) such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g., Tyvek suits).

3.2 Electrical Service Platform

The ESPs will include step-up transformers and other electrical gear. Vineyard Mid-Atlantic will maintain spill response equipment at the ESPs. Brooms, shovels, sorbents, pigs, socks, and a spill overpack drum will be maintained at the ESP for response to minor leaks and spills. In addition, Vineyard Mid-Atlantic will have on-hand PPE such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g., Tyvek suits).

3.3 Oil Spill Removal Organization

Vineyard Mid-Atlantic will retain a third-party OSRO. NYSDEC cannot recommend an OSRO but refers to a list of companies licensed as hazardous waste transporters who provide emergency response services and cleanups of Oil & Hazardous Material (OHM) spills. The list of contractors in the RRT II Region is available at: https://www.cleanupoil.com/. Emergency response contractors located near the Lease Area include the following:

- Clean Water of New York (Staten Island) - (718) 981-4600
- ACV Enviro (Brooklyn) - (800) 777-4557
- NRC (Great River) – (877) 880-4672
- Miller Environmental Group (Long Island) - (800) 394-8606

In addition, U.S. Coast Guard-certified OSROs for the USCG District 1 can be found at https://cgrri.uscg.mil/UserReports/OSROPOCReport.aspx. Response times for mobilization of OSRO resources will be dependent on the location of the OSRO.

The selected spill contractor will be responsible for the inspection and maintenance of their equipment. The equipment should be inspected on at least a monthly basis.

3.4 Response Equipment

Response equipment on the WTGs and ESPs will be inspected at least quarterly and maintained to ensure optimal performance. Records of inspections of response equipment must be maintained for at least three years and made available to authorized BSEE representatives upon request. Inspections of contractor equipment are addressed in Section 3.8.

The program of maintenance and testing of emergency response equipment involves four activities: Operability Check, Inventory, Inspection, and Maintenance. The Spill Response Coordinator or designee is required to sign the inspection form and will be responsible for any follow-up actions that may be required as a result of the inspection, inventory, or test of emergency response equipment. For any items that cannot be replaced or repaired during the inspection, test, or inventory, the inspector will indicate the need for further action on the inspection form. It will then become the responsibility of the Emergency Response Team (ERT) Coordinator to take further actions(s) as required.

3.5 Operability Check (Semi-annual)

This activity is intended to periodically ensure the operability of certain items of equipment in the Vineyard Mid Atlantic emergency equipment inventory, so that it is in a constant state of readiness for deployment. The designated inspector will check the operability of equipment including safety monitoring equipment and outboard motors. Any equipment that is electronic, electrical, or mechanical will be tested under actual load or use conditions.

During the operability check, the inspector will also perform routine maintenance on the equipment, as needed, such as battery replacements, oil and filter changes, and cleaning of boom. The inspector will indicate on the inspection form any problems encountered with the equipment and corrective measures taken or needed.

3.6 Inventory (Monthly)

The inspector will verify the availability and condition of the variety of supplies, materials, and tools that are maintained in storage. The inspector will work from a list of items that are required to be maintained at all times. Any discrepancies in the list, or item replacement needs, will be noted on the inventory form. Inspection for condition of emergency resources will be checked semi-annually.

3.7 Inspections

The semi-annual inspection of the sorbent booms will involve complete removal of booms from storage and the laying-out of the booms in an area that would not cause damage to the fabric of the booms. The inspector will examine each length of boom closely, making note of any fabric damages or wear, broken or frayed cable, missing weights, and damaged connectors. The inspector will also verify the quantity of boom that is in storage to ensure there is sufficient supply. Any damages will be repaired, if possible. If the length of boom cannot be economically repaired, the inspector will request replacement.

3.8 Contractor Equipment

The Spill Response Coordinator will ensure that the contractor has a maintenance program established for its equipment. A copy of the program would be requested and kept on file.

4 Agreement with Oil Spill Removal Organization

Vineyard Mid-Atlantic has not yet been approved. Details regarding contractual agreements will be finalized prior to construction.

Per 30 CFR 254.25, this contractual agreements' section must furnish proof of any contracts or membership agreements with OSROs, cooperatives, spill-response service providers, or spill management team members who are not Vineyard Mid-Atlantic employees that are cited in the OSRP. Documentation should include copies of the contracts, or membership agreements, or certification that contracts or membership agreements are in effect. The contract or membership agreement must include provisions for ensuring the availability of the personnel and/or equipment on a 24-hour-per-day basis.

Vineyard Mid-Atlantic will retain a third-party OSRO. Emergency response contractors located near the Lease Area include Clean Water of New York (Staten Island), ACV Enviro (Brooklyn), NRC (Great River), and Miller Environmental Group (Long Island).

In addition, U.S. Coast Guard-certified OSROs for the USCG District 1 can be found at https://cgrri.uscg.mil/UserReports/OSROPOCReport.aspx. Response times for mobilization of OSRO resources will be dependent on the location of the OSRO.

The selected spill contractor will be responsible for the inspection and maintenance of their equipment. The equipment should be inspected on at least a monthly basis.

5 Worst Case Discharge – Planning Calculations for Discharge Volumes, Response Equipment, and Detailed Spill Response Plan

Per 30 CFR 254.26, the volume of the worst-case discharge scenario must be determined using the criteria in 30 CFR 254.47. The criteria in 30 CFR 254.47 applies to oil production platform facilities and pipeline facilities. Per BSEE/BOEM guidance titled, "OSRP for Offshore Wind Facilities Discussion Handout" dated August 21, 2019, the worst-case discharge for a renewable energy facility is defined as the discharge of all oil from a component located at an offshore facility, such as a WTG or an ESP.

5.1 Worst Case Discharge

The worst case oil discharge associated with Vineyard Mid-Atlantic is conservatively assessed as a catastrophic spill of all oil contents from the topple of an ESP located closest to shore within the Lease Area.

The oil sources in the WTGs include transformer oil, drive train main bearing oil, and hydraulic oil, which total approximately 6,604 gallons (157 barrels [bbl]) for the largest WTG (Table 5.1-1). Oil sources in the ESPs include diesel oil from the emergency generator, diesel engine, and fuel oil storage tank and naphthenic oil from the emergency generator, platform crane, power transformers, reactors, auxiliary/earthing transformers, and other general sources. The oil sources associated with one ESP total approximately 373,969 gallons (8,047 bbl) (Table 5.1-2).

Table 5.1-1 WTG Oil Storage Volume

Oil Source	Gallons	Approximate Barrels
Drive Train Main Bearing	1,486	35.4
Hydraulic System	660	15.7
Transformer	3,963	94.4
Grease	495	11.8
TOTAL per WTG	**6,604**	**157.3**

Table 5.1-2 ESP Oil Storage Volume

Oil Source	Gallons	Approximate Barrels
Emergency Generator – Diesel Day Tank	28,478	678
Diesel Engine		
Fuel Oil Storage Tank		
Emergency Generator – Lubrication Oil (Naphthenic Oil)	25	0.6
Platform Crane – Hydraulic Oil (Naphthenic Oil)	569	14

Table 5.1-2 ESP Oil Storage Volume (Continued)

Oil Source	Gallons	Approximate Barrels
Power Transformers, Reactors, and Auxiliary/Earthing Transformer (two units) – Naphthenic Oil	308,025	7,334
General Oil – Naphthenic Oil	872	21
TOTAL per ESP	**337,969**	**8,048**

5.2 Oil Volume and Spill Containment

If all the oils associated with the ESPs were discharged, the largest worst case discharge scenario would be 337,969 gallons (8,047 bbl). However, control measures (e.g., containment structures) would be in place to contain a spill of oil. Where possible, biodegradable oils will be used. In addition, monitoring equipment will be used to detect a spill. Monitoring equipment being considered include closed circuit televisions, supervisory control and data acquisition, alarm systems (e.g., tank level, containment liquids, etc.), and oil detection equipment for the sump tank. The equipment will be monitored remotely from a "control room". Specific details will be identified in the final version of the OSRP.

Based on the current conceptual ESP design and subject to ongoing refinements, the ESP platform is expected to be equipped with a drain system consisting of containment structures, piping, an oil/water separator (OWS), and a sump tank. The containment structures are sized according to the largest container and are connected via a piping system, draining liquids under gravity to an OWS and a sump tank. The sump tank must be dimensioned for the largest amount of oil, deluge water, and firewater coming from an oil-filled equipment during the greatest incident plus spare capacity (15% recommended). The sump tank may be emptied by a service vessel for proper disposal of the oily substances onshore.

The ESPs will likely include an OWS, subject to the final ESP design. Rainwater and oily substances are separated in the OWS before water is led overboard. Water being led overboard is monitored for oil contamination. As per maritime regulations, the oil content in the water processed from the OWS must be less than 15 parts per million (ppm) of oil. The 15 ppm alarm shall activate to indicate when this level cannot be maintained and initiate automatic stop of overboard discharge of oily mixtures where applicable. The overboard line will be closed, and the drained liquids are fed to the sump tank and stored, in the event of a discharge.

In general, all equipment that contains an environmentally harmful substance is placed above drip trays. The area of the platform where the transformers are placed is expected to be a plated area with drains, acting as drip trays. Drip trays that have the potential to collect rainwater are connected via the OWS to the sump tank. Other drip trays (e.g., indoor) which collect only harmful substances may be connected directly to the sump tank.

Any temporary piping connections transporting oily substances (e.g., between diesel storage container and emergency generator) will be made using off-shore certified dry-break connectors and placed above a drip tray. A simple oil spillage kit, allowing to mitigate small, local spillage during maintenance, will be part of the delivery.

The WTGs contain up to approximately 6,604 gallons (157 bbl) of oil per WTG. The WTGs are designed to have a fiberglass secondary containment system, which would be sized according to the largest container.

5.3 Oil Spill Trajectory

Based on 30 CFR 254.26, an appropriate oil spill trajectory analysis was conducted. This analysis identified the onshore and offshore areas that a discharge could potentially affect. The oil spill modeling study assessed the trajectory and weathering of oil following a catastrophic discharge of all oil contents from the topple of the ESP located the closest to shore within the Lease Area (during a time period that oil could reasonably be expected to persist in the environment). These would be the worst case discharge scenarios, involving a relatively small and finite discharge of oil (on the order of 337,969 gallons [8,047 bbl] in comparison to a larger multi-million barrel catastrophic incident, such as the Deepwater Horizon oil spill). It is important to note again that the modeling conducted includes the conservative assumption that no oil spill response or mitigation would occur. In fact, Vineyard Mid-Atlantic would employ containment and recovery methods, including response equipment employed on water that would be used to prevent the spread of the spill, contain the oil to as small an area as possible, and protect sensitive areas before they are impacted. A full description of the oil spill modeling and results are provided in Annex 5 of this OSRP.

5.4 Resources of Special Economic or Environmental Importance

Refer to Sections 2.4.2 and 2.5 for an overview of the resources of special economic and environmental importance, if any, specified in the appropriate Area Contingency Plans that may be affected in the event of an oil spill from Vineyard Mid-Atlantic.

The oil spill modeling results (see Annex 5) conservatively assume that no oil spill response or mitigation would occur. This is a very conservative assumption as the ESP will be designed with containment, and Vineyard Mid-Atlantic would employ containment and recovery methods to contain and recover onshore and aquatic petroleum spills. Under these very conservative assumptions, the modeling results indicate for an unmitigated worst case oil release from the two representative ESP locations (ESP 1 and ESP 2; Figure 1.1-1), there would be a less than or less than or equal to 10% probability that oil above a minimum thickness of 100 µm (0.004 in [100 g/m^2 on average over the grid cell]) would reach the shorelines of Long Island, New York, and mid-to-south New Jersey within 20 days of release for the spring, summer, and fall scenarios, respectively. In the winter scenario, the predicted areas of probability greater than1% with shoreline oil contamination above a minimum thickness of 100 μm (0.004 in [100 g/m^2 on average over the grid cell]) were contained to the New Jersey coast and were predicted to hit the shoreline within 7 to 10 days of the release.

When comparing the oil spill modeling results with the National ESI shoreline data for New York, the shores of southern Long Island that would likely be the first shorelines to be impacted by a spill (prior to response equipment being deployed) are primarily dominated by sand and gravel beaches and riprap. Some of the specific areas of environmental concern along the southern shores of Long Island that would be taken into special consideration in the event of an oil spill include Coney Island, Great Kills Park, and the Amagansett and Wertheim National Wildlife Refuges.

5.4.1 Potential Failure Scenarios

Specific mitigation actions and responses to be taken will depend on the nature of the situation. However, certain failure scenarios share common characteristics for mitigation. Mitigation procedures will be performed with consideration for health and safety as the top priority.

Vineyard Mid-Atlantic is being developed and permitted using a Project Design Envelope (PDE). The PDE outlines a reasonable range of project design parameters. Potential failure scenarios will be developed as key Vineyard Mid-Atlantic components are selected.

The physical-chemical properties of the oils used are important in spill response contingency planning. Any spill response at Vineyard Mid-Atlantic's offshore facilities should be guided by the SDSs (see Annex 4). For example, dielectric insulating fluids or synthetic oils have environmental fate/transport and affinity for sorbent boom different from petroleum oils. Boom made of natural fiber (e.g., coconut husk) can be more effective than traditional polyethylene boom to cleanup spills of these fluids/oils. These fluids/synthetics are commonly light-colored, milky white, or frothy in appearance on the water surface in relatively protected marine environments. There may be no obvious rainbow sheen. In un-protected marine environments, these sheens might be very difficult to detect. In the open ocean where Vineyard Mid-Atlantic's offshore facilities are located, the high-energy environment will readily disperse this oil into the water column. This tendency will be considered when selecting a response option to this type of spill. Drum or disk skimmers have been shown in lab tests to be most effective on these oils. In addition, due to the difficulty in visually locating these sheens and their tendency to disperse, a spill of dielectric insulating fluid or synthetic oil can continue for a period of time without detection and without being able to locate and secure the source. Although there are challenges in detecting these oils, Vineyard Mid-Atlantic's offshore facilities will be closely monitored for any incidents, and the likelihood of any spills is very low. All equipment will be carefully maintained at all times to reduce the possibility of an incident.

5.5 Response

Vineyard Mid-Atlantic has not yet been approved. Details regarding spill response materials, services, equipment, and response vessels have not been finalized at this time.

The WTGs and ESPs have been designed to utilize secondary containment systems to prevent a discharge of oil to the environment. Containment will be provided considering the size of the largest container. The secondary containment for the ESPs is connected to a sump tank. In addition, an oil/water separator will likely be in use. It is unlikely that a discharge of oil would not be contained by the Mid-Atlantic systems.

Oils used by Vineyard Mid-Atlantic have a specific gravity of less than 1.0. Therefore, any discharges of oil to water would float on the surface of the water, and on-water mechanical recovery techniques could be used to recover the spilled oil.

Vineyard Mid-Atlantic will retain a third-party OSRO to assist in the unlikely event of a discharge of oil to the environment. In addition, Vineyard Mid-Atlantic will maintain pier space for CTVs and/or other support vessels. CTVs are purpose built to support offshore wind energy projects and are set up to safely and quickly transport personnel, parts, and equipment. In addition to vessels, Vineyard Mid-Atlantic will maintain spill response equipment such as a spill overpack drum, containment bladders, absorbent booms, pigs, socks, and other sorbent materials. In addition, Vineyard Mid-Atlantic will have on-hand PPE such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g., Tyvek suits).

NYSDEC cannot recommend an OSRO but refers to a list of companies licensed as hazardous waste transporters who provide emergency response services and cleanups of OHM spills. The list of contractors in the RRT II Region is available at: https://www.cleanupoil.com/. Emergency response contractors located near the Lease Area include Clean Water of New York (Staten Island), ACV Enviro (Brooklyn), NRC (Great River), and (Miller Environmental Group (Long Island).

Once an OSRO is contracted, additional details will be provided regarding spill response resources and the time needed for procurement. In addition, a discussion of response to worst case scenario in adverse weather conditions will be addressed. Per 33 CFR 115.1020, factors to consider when evaluating adverse weather include, but are not limited to, significant wave height, ice, temperature, weather-related visibility, and currents.

Sections 2.4 and 2.5 address the overall response to a possible oil spill at Vineyard Mid-Atlantic. The use of dispersants is covered in Section 2.7, and the use of in-situ burning is covered in Section 2.8. Please refer to those sections for more complete details on the response.

5.5.1 Procedures for Mobilization of Resources

A major consideration during a spill is the organization and direction of the transportation of manpower, equipment, and materials used in response operations. The QI will work with local authorities (state police) to establish land routes to expedite the movement of personnel, equipment, materials, and supplies to the Staging Area and waste products from the Staging Area. The Staging Area is an ICS facility used as a forward operations location to mobilize response resources to the spill site. A Staging Area Manager will be responsible for managing the Staging Area and will utilize status boards to coordinate all equipment, personnel, and materials mobilized to the spill site. Equipment will first be mobilized from the OSRO warehouse to the Staging Area. The Staging Area Manager will direct response equipment to the appropriate Branch/Division/Group/Task Force/Strike Team.

Vineyard Mid-Atlantic expects to use one or more onshore O&M facilities to support the operation of Vineyard Mid-Atlantic's offshore facilities. During operations, the offshore and onshore facilities will be continuously remotely monitored from one or more control center(s) located at the Proponent's operations and maintenance (O&M) facilities and/or a third party's facilities. The O&M facilities are expected to include dock space for SOVs, SATVs, CTVs, and/or other support vessels. Details regarding spill response materials, services, equipment, and response vessels have not been finalized at this time. Vineyard Mid-Atlantic will retain a third-party OSRO that is licensed as a hazardous waste transporter and can provide emergency response services and cleanups of oil and/or other hazardous material spills. Emergency response contractors located near the Lease Area include Clean Water of New York (Staten Island), ACV Enviro (Brooklyn), NRC (Great River), and (Miller Environmental Group (Long Island). In addition, U.S. Coast Guard-certified OSROs for the USCG District 1 can be found at https://cgrri.uscg.mil/UserReports/OSROPOCReport.aspx. Response times for mobilization of OSRO resources will be dependent on the location of the OSRO.

6 Drill and Exercises, Training and Logs

Facility response training, ICS training, personnel response training, drills/exercises, and spill prevention meetings in this section comply with the requirements of 30 CFR 254.41. Training certificates and training attendance records must be maintained and retained in a designated location for at least three years and provided to BSEE upon request. Vineyard Mid-Atlantic will maintain documentation of training in the Boston, Massachusetts office. Training records must be made available to any authorized BSEE representative upon request. The Emergency Response Critique forms used to document inspections, drills, and training are included in Table A3-1.

6.1 Drills and Exercises

Per 30 CFR 254.42(a), the entire OSRP must be exercised at least once every three years. However, to satisfy this requirement, separate exercises may be conducted over a three-year period. Exercises will simulate conditions in the area of operations, including seasonal weather variations, to the extent practicable. In addition, exercises will cover a range of scenarios, such as spills of a short duration and limited volume and the worst case discharge scenario.

A schedule of exercises will be determined by management in accordance with 30 CFR 254.42(b). The Chief of OSPD may require a change in the frequency of required exercises. Actual training exercises will be coordinated with the OSRO. Response training programs will comply with the Preparedness for Response Exercise Program (PREP) and the USCG/EPA training guidelines for oil spill response. Table A3-1 includes a list of regular personnel training exercises. This section includes Drill/Exercise Documentation Forms to be used to document drills and exercises. The Chief of OSPD and BOEM must be notified at least 30 days prior to the following exercises: annual incident management team tabletop exercise; annual deployment exercise of response equipment identified in the OSRP that is staged at onshore locations; and semi-annual deployment exercises of any response equipment which the BSEE Regional Supervisor requires Vineyard Mid-Atlantic to maintain at the facility or on dedicated vessels. The annual IMT tabletop exercise will include the actual notification to the NRC, BSEE Regional Supervisor, BOEM, and the OSRO to determine availability and response times. Each call that is made will begin with the statement "This is a drill."

As detailed in this section, several types of drills are conducted as part of the drill program as follows:

- Notification drills to test communications procedures will be conducted monthly.
- QI notification drills will be conducted at least quarterly to verify that the QI can be reached in an emergency situation to perform required duties.
- The Spill Management Team will participate in a table-top drill annually. A tabletop drill will also be included in other drills as often as possible.

- Unannounced annual notification drills will be performed. These drills will be conducted with BSEE OSPD, BOEM, and OSRO participation. These annual drills will simulate a response action and conveyance of key information between the QI, BOEM, and the BSEE OSPD.
- Every effort is made to cooperate in local drills requested by regulatory agencies and neighbors.
- OSROs under contract will be drilled at least annually.
- Full-scale exercises will be conducted every four years and will involve federal, state, and local government agencies, including BSEE, BOEM, and USCG.

The annual notification drill will be an opportunity for the QI, BOEM, and BSEE OSPD to simulate an incident command post setting that is capable of supporting response efforts (e.g., deployment of personnel and equipment, tracking containment efforts, taking samples, shoreline cleanup, etc.) for a variety of spill scenarios. Prior to the drill, the size and scope of the drill will be defined and will be structured of various levels of complexity to test events ranging from implementation of specific components of the OSRP to full implementation of the plan.

Facility spill response drills are comprehensive and designed to improve response actions at the level of the first responder. A tabletop planning session is held prior to the drill, with a limited number of supervisory personnel informed of the drill.

Drills are conducted to enable personnel who will act as initial responders during an actual spill to become familiar with response equipment. During spill drills, the techniques of pulling and placing boom such as for diversion, deflection, and containment are practiced. Drills are also conducted to allow personnel to become familiar with climatic conditions, such as the interactions of wind, tide, and wave actions and their effect on oil movement. In spill drills, consideration is given to sensitive areas which may be affected and need protection.

As part of the drill process, a critique is held following the drill. All personnel who participate in the drill, including observers, also participate in the critique. The purpose of this is to review the drill for procedures which worked well and procedures which did not work well. Each individual has an opportunity to provide input. Recommendations are submitted to management.

Annually, at least one of the exercises listed in Annex 3 must be unannounced. Unannounced means the personnel participating in the exercise must not be advised in advance of the exact date, time, and scenario of the exercise. The staff from Vineyard Mid-Atlantic will also participate in unannounced exercises as directed by the lead federal agency. The objectives of the unannounced exercises will be to test notifications and equipment deployment for response to the average most probable discharge. After Vineyard Mid-Atlantic personnel successfully complete a Government-Initiated Unannounced Exercise (GIUE), they will not be required to participate in another one for at least 36 months from the date of the exercise.

Vineyard Mid-Atlantic personnel will also participate in exercises of the ACP as directed by the USCG FOSC. As part of the National PREP, the USCG Sector Long Island FOSC will either direct a government-led PREP exercise where Vineyard Mid-Atlantic could participate as the Responsible Party, or Vineyard Mid-Atlantic could lead the exercise design and facilitation effort for an industry-led PREP exercise. These exercises are typically full-scale exercises involving both an Incident Command Post element exercising the IMT and a field deployment element where spill response equipment is actually deployed. Area exercises test the ACP and are required on a quadrennial schedule. In either a government-led or industry-led PREP exercise, Vineyard Mid-Atlantic would be a main player on the Exercise Design Team along with the USCG, NYSDEC, and other federal, state, and local stakeholders.

An Exercise Drill Log will be developed and maintained by the Training Department at Vineyard Mid-Atlantic to record all drills and exercises completed at the facility. An example training log form is presented in Annex 3. Records of these activities will be maintained for a period of three years, as per 30 CFR 254.42(e).

6.2 Planned Training

Planned training sessions are held for staff and operations personnel on an annual basis to gain an understanding of the OSRP process. The intent of these sessions is to keep personnel informed of their obligation to respond to all emergencies, to prevent pollution incidents, to improve spill control and response techniques, and to gain a comprehensive understanding of the ICS and their responsibilities on the IMT. These briefings highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures to prevent spills.

Members of the Spill Response Operating Team who are responsible for operating response equipment will attend hands-on training classes at least annually. This training will include the deployment and operation of all response equipment. Supervisors of the team will receive this training and will also be trained annually on directing the deployment.

All field personnel and members of the spill response management team or IMT, including the Spill Response Coordinator and alternate Spill Response Coordinators, will receive annual training on their duties. This training will include:

- The proper procedures for the reporting of spills, including procedures for contacting the QI on a 24-hour basis.
- Locations, intended use, deployment strategies, and operational and logistical requirements of response equipment. They will also review procedures on how and

where to place facility containment/recovery materials depending on where the spill occurs and various seasonal conditions. Personnel will be informed that detergents or other surfactants are prohibited from being used on an oil spill in the water.

- Oil spill trajectory analysis and predicting spill movement.
- Other responsibilities of the IMT, including ICS procedures and roles.

The QI, Spill Response Coordinator, and alternate Spill Response Coordinators will receive specific training to ensure they are sufficiently trained to perform their duties.

Records of all training activities are maintained and retained for at least three years following completion of training. The facility will maintain records for each individual as long as these individuals are assigned duties in this plan. Individuals will sign documentation when participating in training classes or exercises as provided in the example in Table A3-2 within Annex 3.

Credit for any of the above drills and exercises may be taken by Vineyard Mid-Atlantic if an actual incident occurs, and records of the incident will be maintained to show evidence of complying with any of the above drill or exercise requirements.

6.2.1 Training Documentation and Record Maintenance

Spill response personnel training records will be maintained at the Vineyard Mid-Atlantic office in Boston, MA. The address for Vineyard Mid-Atlantic's Boston office is 200 Clarendon Street, 18th Floor, Boston, MA 02116. An example training record is provided in Table A3-2. Records will be maintained and retained at this location for three years and provided to BSEE upon request. These records will include:

- Documentation of annual training associated with the OSRP provided to the QI, Alternate QI, Spill Response Coordinator, alternate Spill Response Coordinator, IMT members, and other facility personnel;
- Records of personnel training in accordance with OSHA 29 CFR §1910.120 regulations;
- Records of training provided for response contractor personnel will be maintained at the respective contractor's office and will be verified by facility personnel on-site; and

Logs of volunteer workers (if applicable) and activities performed.

Annexes

Annex 1 Vineyard Mid-Atlantic External Notification List

Table A1-1 Vineyard Mid-Atlantic External Notification List

Agency	Location	Telephone
Federal and State Agencies		
National Response Center	2703 Martin Luther King Jr. Avenue SE Washington, D.C. 20593	800-424-8802 (24 hr)
USCG Sector Long Island Sound (if oil spill threatens CT waters)	120 Woodward Avenue New Haven, CT 06512	203-468-4401
USCG Sector New York	212 Coast Guard Dr Staten Island, NY 10305	718-354-4037
USCG Sector Southeastern New England	30 Little Harbor Road Woods Hole, MA 02543	508-457-3211 or 508-538-2300
USCG Sector Delaware Bay	1 Washington Ave Philadelphia, PA 19147	215-271-4800
BSEE Atlantic OCS Region	1201 Elmwood Park Boulevard New Orleans, LA 70123	504-736-0557
BOEM Atlantic OCS Region	1201 Elmwood Park Boulevard New Orleans, LA 70123	1-800-200-4853
EPA Region 1	5 Post Office Square, Suite 100 Boston, MA 02109	888-372-7341 or 617-918-1111
OSHA (fatality or 3 or more employees sent to hospital)	200 Constitution Avenue Washington, D.C. 20210	800-321-6742
New York State Department of Environmental Conservation (NYSDEC)	625 Broadway Albany, NY 12233	1-800-457-7362 or 1-518 457-7362 for calls outside New York State
New Jersey Department of Environmental Protection (NJDEP)	401 E State St, 7th floor Trenton, NJ 08608	1-877-927-6337
Connecticut Department of Energy and Environmental Protection (CT DEEP)	79 Elm St Hartford, CT 06106	(860) 424-3338 or (866)-DEP-SPIL
Rhode Island Department of Environmental Management (RIDEM)	235 Promenade St Providence, RI 02908	(401) 222-1360
Massachusetts Department of Environmental Protection (MassDEP)	1 Winter St Boston, MA 02108	(888) 304-1133
Delaware Department of Natural Resources and Environmental Control (DE DNREC)	Richardson & Robbins Building, 89 Kings Highway SW Dover, DE 19901	(800)-662-8802
Maryland Department of the Environment (MDE)	1800 Washington Boulevard Baltimore, MD 21230	(866)-633-4646

Table A1-1 Vineyard Mid-Atlantic External Notification List (Continued)

Agency	Location	Telephone
Federal and State Agencies (Continued)		
Virgina Department of Environmental Quality (VA DEQ)	1111 E Main St Suite 1400 Richmond, VA 23219	1-800-468-8892
USCG Classified Oil Spill Removal Organizations (OSRO)		
Vineyard Mid-Atlantic has not selected an OSRO at this time. NYSDEC cannot recommend an OSRO but refers to a list of companies licensed as hazardous waste transporters who provide emergency response services and cleanups of Oil & Hazardous Material (OHM) spills. The list of contractors in the RRT II Region is available at: https://www.cleanupoil.com/. The USCG Classified OSRO for USCG District 1 can be found at: https://cgrri.uscg.mil/UserReports/WebClassificationReport.aspx.		
Weather		
National Oceanic & Atmospheric Administration (NOAA) National Weather Service National Weather Service	445 Myles Standish Boulevard Taunton, MA 02870	508-822-0634 (forecasts) 508-828.2672 (general info) http://www.weather.gov/box/
NOAA National Data Buoy Center	http://www.ndbc.noaa.gov/maps/Northeast.shtml	
Aviation Resources		
Vineyard Mid-Atlantic has not selected aviation resources at this time. A list of New York charter operators is available at: https://www.aircharterguide.com/listingsearch?dt=8&state=ny%20		
Marine Resources		
New York City (NYC) Ferry	111 58th St Brooklyn, NY 11220	844-469-3377
The Block Island Ferry	304 Great Island Road Narragansett RI, 20882	401-783-7996
Fire Island Ferries	99 Maple Ave Bay Shore, NY 11706	631-665-3600
Regulatory Agencies for Wildlife		
US Fish and Wildlife Service Northeast Regional Office	300 Westgate Center Drive Hadley, MA 01035	413-253-8200
US Fish and Wildlife Service New England Field Office	70 Commercial Street Suite 300 Concord, NH 03301	603-223-2541
Other Wildlife Resources		
New York City Audubon Society	71 W 23rd St New York, NY 10010	212-691-7483
Seatuck Environmental Association	Islip, NY 11751	631-581-6908
NOAA Greater Atlantic Fisheries Office	55 Great Republic Drive Gloucester, MA 01930	866-755-6622
Licensed Wildlife Rehabilitation Providers		
New York State maintains a list of licensed wildlife rehabilitators at: https://www.dec.ny.gov/cfmx/extapps/sls_searches/index.cfm?p=live_rehab		

Table A1-1 Vineyard Mid-Atlantic External Notification List (Continued)

Agency	Location	Telephone
Medical Facilities		
Mercy Hospital	1000 N Village Ave Rockville Centre, NY 11570	516-705-2525
St. Joseph Hospital	4295 Hempstead Tpke Bethpage, NY 11714	516-579-6000
Good Samaritan University Hospital	1000 Montauk Hwy West Islip, NY 11795	631-376-3000
South Shore University Hospital	301 E Main St Bay Shore, NY 11706	631-968-3000
Long Island Community Hospital	101 Hospital Rd Patchogue, NY 11772	631-654-7100
LI Urgent Care	403 Little E Neck Rd West Babylon, NY 11704	631-716-5463
CityMD South Bay Shore Urgent Care- Long Island	1850 Sunrise Hwy Bay Shore, NY 11706	631-581-5900
Ambulances		
Emergency Ambulance Service	30 Commercial St Freeport, NY 11520	631-244-0280
AAA Ambulette Services	122 Verdi St Farmingdale, NY 11735	516-753-1616
Bay Shore Brightwaters Rescue Ambulance	911 Aletta Pl #7940 Bay Shore, NY 11706	631-666-5600
Community Ambulance Company	420 Lakeland Ave Sayville, NY 11782	631-567-2586
Emergency Ambulance Service	230 E Montauk Hwy Hampton Bays, NY 11946	631-244-0280
Horizon Air Ambulance (Medevac, Airlift)	14 Pinewoods Crescent Middle Island, NY 11953	631-662-5425
VCI Emergency Vehicle Specialists (Medevac)	920 Lincoln Ave Holbrook, NY 11741	631-567-3838
Coast Guard Station- Fire Island	Fire Island 1 Coast Guard Station Babylon, NY 11702	631-661-9100
Coast Guard Station- Jones Beach	Jones Beach Bay Pkwy Hempstead, NY 11569	516-785-2995
Fire Aid (911)		
Island Park Fire Department	440 Long Beach Rd Island Park, NY 11558	516-431-1213
Copiague Fire Department	320 Great Neck Rd Copiague, NY 11726	631-842-1100
Lindenhurst Fire Department	225 S Wellwood Ave Lindenhurst, NY 11757	631-957-7530
Bay Shore Fire Department	195 5th Ave Bay Shore, NY 11706	631-665-4227

Table A1-1 Vineyard Mid-Atlantic External Notification List (Continued)

Agency	Location	Telephone
Fire Aid (911) (Continued)		
Patchogue Fire Department	15 Jennings Ave Patchogue, NY 11772	631-475-1225
Middle Island Fire Department	31 Arnold Dr Middle Island, NY 11953	631-924-3116
Greenport Fire Department	236 3rd St Greenport, NY 11944	631-477-1943
Police Aid (911)		
Nassau County Police Department (Jones Beach)	3636 Merrick Rd Seaford, NY 11783	516-573-6700
Suffolk County Police Department	555 Babylon Farmingdale Rd West Babylon, NY 11704	631-854-8100
Harbor Police Department	28 Nassau Ave Islip, NY 11751	631-224-5656
New York State Police Department	7140 Republic Airport Farmingdale, NY 11735	631-756-3300
New Jersey State Police Department	400 Garden State Pkwy Woodbridge, NJ 07095	732-376-1117
Rhode Island State Police Department	7875 Post Rd North Kingstown, RI 02852	401-444-1064
DSNY Environmental Police	465 Hamilton Ave Brooklyn, NY 11232	718-768-4034
New York Department of Public Safety	65-30 Kissena Blvd Flushing, NY 11367	718-997-5911
US Marshals Services	50 Walnut St #2009 Newark, NJ 07102	973-645-2404
Federal Bureau of Investigation	8002 Kew Gardens Rd Queens, NY 11415	718-286-7100
Local Government and Agencies		
Shinnecock Tribal Office	1 Church St Southampton, NY 11968	631-283-6143
Poospatuck Tribal Council	151 Poospatuck Ln Mastic, NY 11950	631-281-6464
New York Indian Council	21-25 44th Ave Queens, NY 11101	718-215-8417 ext. 312
Nassau County Department of Health	200 County Seat Dr Mineola, NY 11501	516-227-9697
Suffolk County Department of Health Services	3500 Sunrise Hwy #124 Great River, NY 11739	631-854-0000
Massapequa Chamber of Commerce	675 Broadway Massapequa, NY 11758	516-541-1443
Greater Patchogue Chamber of Commerce	15 N Ocean Ave Patchogue, NY 11772	631-207-1000

Table A1-1 Vineyard Mid-Atlantic External Notification List (Continued)

Agency	Location	Telephone
Local Government and Agencies (Continued)		
Hempstead Town Hall	1 Washington St Hempstead, NY 11550	516-489-5000
Town of Oyster Bay/Town Hall South	977 Hicksville Rd Massapequa, NY 11758	516-797-4128

Annex 2 Incident and Other Documentation Forms

The QI will coordinate the documentation during the incident, and for post-incident review, in conjunction with federal, state, and local officials, as well as with others familiar with the incident. Forms to assist in documentation and presentation of consistent notification information are presented at the end of this Annex for use during an incident. These include:

- Initial Notification;
- Agency Call Back for Information;
- Chronological Log of Incident; and
- Incident Report.

As an alternative, or in addition to, the NIMS ICS Forms noted below may also be used. These can be accessed online at: https://www.fema.gov/media-library/assets/documents/103505.

Table A2-1 NIMS ICS Forms

Agency	Description
IAP	Cover Sheet Incident Action Plan (IAP)
201	Incident Briefing
202	Incident Objectives
203	Organization Assignment List
204	Assignment List
204a	Assignment List Attachment
205	Incident Communications Plan
206	Medical Plan
207	Incident Organization Chart
208	Site Safety Plan
209	Incident Status Summary
210	Resource Status Change
211	Incident Check-In List
213	General Message
213-RR	Resource Request
214	Unit Log
215	Operational Planning Worksheet
215a	IAP Safety Analysis Form
218	Support Vehicle/Equipment Inventory
219	Resource Status Card (T-Cards)
220	Air Operations Summary
221	Demobilization Checkout
224	Crew Performance Rating

Table A2-1 NIMS ICS Forms (Continued)

Agency	Description
225	Incident Personnel Performance Rating
230	Daily Meeting Schedule
232	Resources at Risk Summary
232a	ACP Site Index
233	Incident Open Action Tracker
234	Work Analysis Matrix
235	Facility Needs Assessment

The post-incident investigation will begin after the source of the incident has been corrected, eliminated, or repaired, and the facility has been declared safe by the QI. The QI will take the following steps during a post-accident investigation:

- Obtain all data, information, and reports pertaining to the incident.
- Interview in person, or by telephone, each person knowledgeable of the incident.
- Review the response of operations personnel to see if procedures and training were adequate or if changes are warranted.
- Evaluate other potentially dangerous situations which could have occurred, and if the response of personnel and safety systems would have accommodated those situations had they occurred.
- Prepare recommendations as appropriate for changes to:
  - Design of facility;
  - Operating procedures;
  - Training;
  - Communications; and
  - Emergency response plans and procedures.
- The QI will prepare and issue a written report to all supervisors with any changes deemed appropriate.

The QI will prepare a post-incident report. This report will contain an account of the incident, including proof that Vineyard Mid-Atlantic met its legal notification requirements for any given incident (i.e., signed record of initial notifications and certified copies of written follow-up reports submitted after a response). Examples of routine equipment and maintenance checklists/logs are also provided. These include:

- Response Equipment Inspection Log;
- Secondary Containment Checklist and Inspection Form;
- Tank Inspection Form; and
- Maintenance Log.

Annex 3 Drills and Exercises Tables and Forms

Table A3-1 Drills and Exercises

Exercise	Purpose/Scope	Objectives	Frequency	Participants
QI Notification Exercise	Ensure the QI can be contacted in a spill response emergency in order to carry out required duties.	Contact QI by telephone, radio, fax, or email. Confirmation received from QI of notification.	Monthly	Qualified Individuals
IMT Tabletop Exercise (TTX)	Ensure the IMT is familiar with the emergency response procedures and the Incident Command System.	IMT is familiar with emergency response procedures. Employs proper procedures during a simulated emergency response.	Annually	IMT, BSEE OSPD, BOEM
On-Site Equipment Deployment Exercise	Verify that required response equipment is operable and facility personnel are capable of deploying the equipment.	Verify that designated equipment is available. Deploy at least the minimum required equipment during exercise. Verify that personnel tasked with deployment have received required training.	Annually	Spill Response Operating Team, BSEE OSPD, BOEM, OSRO
OSRO Equipment Deployment Exercise	Same as above, but performed by OSRO	Same as above	Annually	OSRO
Discharge Prevention Briefings	Conduct Discharge Prevention Briefings	Personnel have adequate understanding of the OSRP. Describe known discharges or failures. Discuss any recently developed precautionary measures.	Annually (optional)	Oil-handling Personnel

Table A3-1 Drills and Exercises (Continued)

Exercise	Purpose/Scope	Objectives	Frequency	Participants
Simulated Spill Drill[2]	Test the resources and response capabilities of the OSRO.	Demonstrate OSRO's ability to deploy resources to include: On water containment and recovery Sensitive habitat protection Storage	Every three years	Oil-handling Personnel
Full-Scale Exercise (FSE)	Test the IMT's capability of establishing a Unified Command and developing an Incident Action Plan. In addition to the work within the Incident Command Post, field personnel will deploy equipment in the field using the same exercise scenario.	Demonstrate IMT's ability to establish the ICS, transfer incident management to a UC formed with government personnel, and produce an Incident Action Plan Demonstrate field personnel's capability to deploy oil spill response equipment to protect sensitive sites	Every four years	QI, Spill Response Coordinator, IMT, federal, state, and local government personnel including OSPD, field personnel

Notes:

1. In a three year period, at least one of these exercises must include a worst case discharge scenario.
2. In a three year period, all components of the response plan must be exercised.
3. Annually at least one of the first three exercises listed must be unannounced to participants.

Table A3-2 Spill Response Drill Form Notification Exercise

VINEYARD MID-ATLANTIC LLC
SPILL RESPONSE DRILL/EXERCISE DOCUMENTATION FORM

NOTIFICATION EXERCISE

1. Date performed: ____

2. Exercise or actual response: ________________________________

   If an exercise, announced or unannounced:_____________________

3. Location of tabletop:____

4. Time started:____

   Time completed:____

5. Response plan scenario used (check one)

   ____Average most probable discharge ____Worst case discharge

   ____Maximum most probable discharge ____Size of (simulated) spill-bbls/gals

6. Describe how the following objectives were exercised:

a) Spill management team's knowledge of oil-spill response plan:

____
____
____

b) Proper notifications:

____
____
____

c) Communications system:

____
____
____

d) Spill management team's ability to access contracted oil spill removal organizations:

____
____
____

e) Spill management team's ability to coordinate spill response with Federal On-Scene Coordinator, State On-Scene Coordinator, and other applicable agencies:

INCIDENT MANAGEMENT TEAM TABLETOP EXERCISE (Continued)

f) Spill management team's ability to access sensitive site and resource information in the Area Contingency Plan:

1. Evaluation of Exercise:

2. Lessons Learned:

3. Changes to be implemented (if any):

Certifying Signature:____

Table A3-3 Spill Response Drill Form Equipment Deployment Exercise

VINEYARD MID-ATLANTIC LLC
SPILL RESPONSE DRILL/EXERCISE DOCUMENTATION FORM

EQUIPMENT DEPLOYMENT EXERCISE

1. Date performed:____
2. Exercise or actual response:____

   If an exercise, announced or unannounced:___________________________________
3. Deployment location(s):

   ____
   ____
   ____
4. Time started:____

   _______Time OSRO called (if applicable)

   _______Time on-scene

   _______Time boom deployed

   _______Time recovery equipment arrives on-scene

   _______Time completed
5. Equipment deployed was:

   _______Facility-owned

   _______OSRO-owned; if so, which OSRO:________________________________

   _______Both
6. List type and amount of all equipment (e.g., boom and skimmers) deployed and number of support personnel employed:

   ____
   ____
   ____
   ____
   ____
7. Describe goals of the equipment deployment and list any Area Contingency Plan strategies tested. Attach a sketch of equipment deployments and booming strategies:

   ____
   ____
   ____
   ____
   ____

EQUIPMENT DEPLOYMENT EXERCISE (Continued)

8. For deployment of facility-owned equipment, was the amount of equipment deployed at least the amount necessary to respond to your facility's average most probable spill?

____
____
____

9. Was the equipment deployed in its intended operating environment?

____
____
____

10. For deployment of OSRO-owned equipment, was a representative sample (at least 1000 feet of each boom type and at least one of each skimmer type) deployed?

____
____
____

11. Was the equipment deployed in its intended operating environment?

____
____
____

12. Are all facility personnel that are responsible for response operations involved in a comprehensive training program, and all pollution response equipment involved in a comprehensive maintenance program?

____
____
____

13. Date of last equipment inspection:____
14. Was the equipment deployed by personnel responsible for its deployment in the event of an actual spill?____
15. Was all deployed equipment operational? If not, why not?

____
____
____

16. Evaluation of Exercise:

____
____
____

EQUIPMENT DEPLOYMENT EXERCISE (Continued)

17. Lessons Learned:

____

____

____

18. Changes to be implemented (if any):

____

____

____

Table A3-4 Vineyard Mid-Atlantic Training Log

VINEYARD MID-ATLANTIC LLC
TRAINING LOG

EMPLOYEE TRAINING

Employee Name	Date	Hours of Training	Training Topic

Annex 4 Safety Data Sheets

Annex 5 Vineyard Mid-Atlantic OCS-A 0544 Offshore Wind Oil Spill Modeling Study

VINEYARD MID-ATLANTIC OCS-A 0544 OFFSHORE WIND OIL SPILL MODELING STUDY

Oil Spill Risk Assessment

Oil Spill Risk Assessment

Vineyard Mid-Atlantic 23-P-221618
Draft v2

September 8, 2023

www.rpsgroup.com

Document Status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review dates
Draft v1	Stochastic Oil Spill Modeling, Vineyard Mid-Atlantic 544	See below	LM	LM	9/1/2023
Draft v2	Stochastic Oil Spill Modeling, Vineyard Mid-Atlantic 544	See below	LM	LM	9/7/2023

Approval for issue

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EXECUTIVE SUMMARY

Vineyard Mid-Atlantic LLC (the "Proponent") proposes to develop, construct, and operate offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0544 (the "Lease Area") along with associated offshore and onshore transmission systems. This proposed development is referred to as "Vineyard Mid-Atlantic." The Lease Area is one of six New York Bight Lease Areas identified by BOEM, following a public process and environmental review, as suitable for offshore wind energy development. Vineyard Mid-Atlantic includes wind turbine generators (WTG) and electrical service platform (ESP) positions within the Lease Area. One or two positions will be occupied by ESPs and the remaining positions will be occupied by WTGs. Offshore export cables installed within an offshore export cable corridor (OECC) will connect the renewable wind energy facilities to onshore transmission systems on Long Island, New York.

Pursuant to 30 CFR 585.627(c), as part of the requirement to submit an Oil Spill Response Plan (OSRP) in accordance with 30 CFR 254.1, the OSRP should include:

> "An appropriate trajectory analysis specific to the area in which the facility is located. The analysis must identify onshore and offshore areas that a discharge potentially could affect. The trajectory analysis chosen must reflect the maximum distance from the facility that oil could move in a time period that it reasonably could be expected to persist in the environment."

Therefore, as an Annex to the Vineyard Mid-Atlantic OSRP, an oil spill modeling study was performed to assess the trajectory and weathering of oil following a catastrophic release of all oil contents from the toppling of the largest volume ESP at two representative locations (i.e., ESP 1 and ESP 2) within the Lease Area. ESP 1 is located approximately 38 kilometers (km) (24 miles [mi]) from Long Island, New York and 83 km (52 mi) from New Jersey, and ESP 2 is located approximately 47 km (29 mi) from Long Island, New York and 67 km (42 mi) from New Jersey. These would be the worst case discharge scenarios and involve a relatively small and finite release of oil (337,969 gallons [gal] or 8,047 barrels [bbl]), which is considerably smaller than potential worst case releases from offshore oil and gas platforms (which could be on the order of multi-million bbl). Vineyard Mid-Atlantic includes one or two ESPs. The oil quantities modeled in this study represent the maximum volume for a single ESP, and the positions modeled for ESP 1 and ESP 2 represent the closest potential locations to New York and New Jersey, respectively. If Vineyard Mid-Atlantic utilizes two ESPs, it is likely that at least one of the ESPs would have lower oil quantities than the volume modeled in this study; therefore, this study represents the worst-case discharge scenario for a single ESP location. Based on the results of a previous BOEM study (Bejarano et al. 2013) assessing potential catastrophic oil spills from offshore wind structures, the probability of occurrence of this type of catastrophic release, such as the toppling of an ESP, is very low (on the order of 1 in ≥ 1,000 years). The ESPs are designed to site-specific conditions in accordance with international and U.S. standards and the designs will be reviewed by a third-party Certified Verification Agent that certifies the design conforms to all applicable standards.

In addition to the low probability of such an event, the oil spill scenarios modeled in this study assume that no oil spill response or mitigation would occur. This is also a very conservative assumption as the ESPs will be designed with containment measures and Vineyard Mid-Atlantic would employ containment and recovery methods to contain and recover onshore and aquatic petroleum spills. In the event of a spill, response equipment employed on water would be used to prevent the spread of the spill; contain the oil to as small an area as possible; and protect sensitive areas before they are affected.

The oil spill model, OILMAP/SIMAP, was used to conduct this assessment. Model inputs included winds, currents, chemical composition and properties of oils of interest, and specifications of the release (amount, location, etc.). Environmental conditions (i.e., wind and current forcing, water temperature, and salinity) play a critical role in the assessment of the trajectory and weathering of oil in a marine spill. Therefore, a data analysis of these conditions as input to the model was also performed. The data analysis also helped to identify the site-specific seasons in which the modeling scenarios should be performed. As a result of this analysis, a total of eight stochastic modeling scenarios (one per season for two representative spill sites) were assessed.

Based on the environmental datasets analyzed as input for the oil spill modeling, the following conclusions can be drawn:

- During winter months, south of Long Island in the Mid-Atlantic Bight (MAB) region which extends from Cape Hatteras, North Carolina to Cape Cod, Massachusetts, defined as the Area of Interest (AOI) for this study, winds are predominantly west-northwesterly with higher speed. Throughout summer months, the winds are mostly south-southwesterly with lower speed. Spring and fall months show characteristics of transitional seasons.
- Annually-averaged HYCOM surface current near the spill sites is eastward with moderate speed.
- Predominant current direction is southeastward/east-southeastward during winter (December through February) and eastward/east-northeastward during summer (June through August). Spring (March through May) and fall (September through November) are the transitional seasons.

Based on the results of the stochastic spill trajectory analysis assessing potential spills of all oil contents of ESP 1 or ESP 2 within the Lease Area:

- The sea surface area exposed to oil exceeding the 0.01 millimeters [mm] (0.0004 inch [in]) threshold is predicted to be contained within a radius up to 200 km (124 mi) of the ESP 1 location and up to 180 km (112 mi) of the ESP 2 location for all four seasons. The sea surface area exposed to oil exceeding the 0.05 mm (0.002 in) threshold is predicted to be contained within a radius up to 75 km (47 mi) of the ESP 1 location and up to 60 km (37 mi) of the ESP 2 location for all four seasons.
- The stochastic footprint of exposed surface waters was smallest for the winter simulation, likely due to increased winds and surface waves that enhanced vertical entrainment into the water column.
- At the ESP 1 location for the spring, summer, and fall scenarios, there is <10% probability that oil above a minimum thickness of 0.1 mm (0.004 in or 100 g/m^2 on average over the grid cell) would reach the shorelines of Long Island, New York and mid-to-south New Jersey within 20 days of the release. In the winter scenario, the predicted areas of probability >1% with shoreline oil contamination above a minimum thickness of 0.1 mm (0.004 in) were contained to the New Jersey coast and were predicted to reach the shoreline within seven to 10 days of the release.
- At the ESP 2 location for the spring, summer, and fall scenarios, there is ≤10% probability that oil above a minimum thickness of 0.1 mm (0.004 in or 100 g/m^2 on average over the grid cell) would reach the shorelines of Long Island, New York and mid-to-south New Jersey within 20 days of the release. In the winter scenario, the predicted areas of probability >1% with shoreline oil contamination above a minimum thickness of 0.1 mm (0.004 in) were contained to the New Jersey coast and were predicted to reach the shoreline within seven to 10 days of the release.

As noted, the stochastic spill trajectory analysis conservatively assesses a catastrophic release of all oil contents from an ESP within the Lease Area. In the unlikely event of a worst-case discharge, Vineyard Mid-Atlantic plans to employ response equipment on water to prevent the spread of the spill; contain the oil to as small an area as possible; and protect sensitive areas before they are affected. Therefore, any potential effects from an oil release are likely to be less than predicted by the conservative worst-case discharge scenario.

Contents

Tables

Figures

1 INTRODUCTION

1.1 Project Background

Vineyard Mid-Atlantic LLC (the "Proponent") proposes to develop, construct, and operate offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0544 (the "Lease Area") along with associated offshore and onshore transmission systems. This proposed development is referred to as "Vineyard Mid-Atlantic." The Lease Area is one of six New York Bight Lease Areas identified by BOEM, following a public process and environmental review, as suitable for offshore wind energy development. Vineyard Mid-Atlantic includes wind turbine generators (WTG) and electrical service platform (ESP) positions within the Lease Area. One or two positions will be occupied by ESPs and the remaining positions will be occupied by WTGs. Offshore export cables installed within an offshore export cable corridor (OECC) will connect the renewable wind energy facilities to onshore transmission systems on Long Island, New York.

Pursuant to 30 CFR 585.627(c), as part of the requirement to submit an Oil Spill Response Plan (OSRP) in accordance with 30 CFR 254.1 with an appropriate trajectory analysis, this Annex documents the oil spill modeling study performed in support of the Construction and Operations Plan (COP) for Vineyard Mid-Atlantic.

Vineyard Mid-Atlantic components containing oil include the WTGs placed on a foundation support structure and ESPs. Oil sources in the ESPs include power transformers, reactors, auxiliary/earthing transformers, diesel tanks, an emergency generator day tank, an emergency generator, and naphthenic oil for a platform crane. The oil sources presented in this document are associated with the two representative ESPs located closest to New York and New Jersey, each containing approximately 337,969 gallons (8,047 barrels [bbl]) of oil.[1] ESP 1 is located approximately 38 km (24 mi) from Long Island, New York, and 83 km (52 mi) from New Jersey, while ESP 2 is located approximately 47 km (29 mi) from Long Island, New York and 67 km (42 mi) from New Jersey.

Table 1 and Figure 1 display the location of the spill sites and local geographic points of reference.

Based on the results of a previous BOEM study (Bejarano et al. 2013) assessing potential catastrophic oil spills from offshore wind structures, the probability of occurrence of this type of catastrophic release, such as the topple of an ESP, is extremely small. As described in COP Volume I, the ESPs are designed to site-specific conditions in accordance with international and United States (US) standards and the designs will be reviewed by a third-party Certified Verification Agent that certifies the design conforms to all applicable standards. In addition to the low probability of such an event, the oil spill scenarios modeled in this study assume that no oil spill response or mitigation would occur. This is also a very conservative assumption as the ESP will be designed with containment measures and Vineyard Mid-Atlantic would employ containment and recovery methods to contain and recover onshore and aquatic petroleum spills. In the event of a spill, response

[1] Vineyard Mid-Atlantic includes one or two ESPs. The oil quantities modeled here represent the maximum volume for a single ESP, and the positions modeled for ESP 1 and ESP 2 represent the closest potential locations to New York and New Jersey, respectively. If Vineyard Mid-Atlantic utilizes two ESPs, it is likely that at least one of the ESPs would have lower oil quantities than the volume modeled in this study; therefore, this study represents the worst-case discharge scenario for a single ESP location.

equipment employed on water would be used to prevent the spread of the spill; contain the oil to as small an area as possible; and protect sensitive areas before they are affected.

Table 1. Release locations used in oil spill modeling.

Site	Description	Latitude N (Decimal Degrees)	Longitude W (Decimal Degrees)
ESP 1	Shortest distance to New York coastline	40.31967	73.00236
ESP 2	Shortest distance to New Jersey coastline	40.20247	73.20659

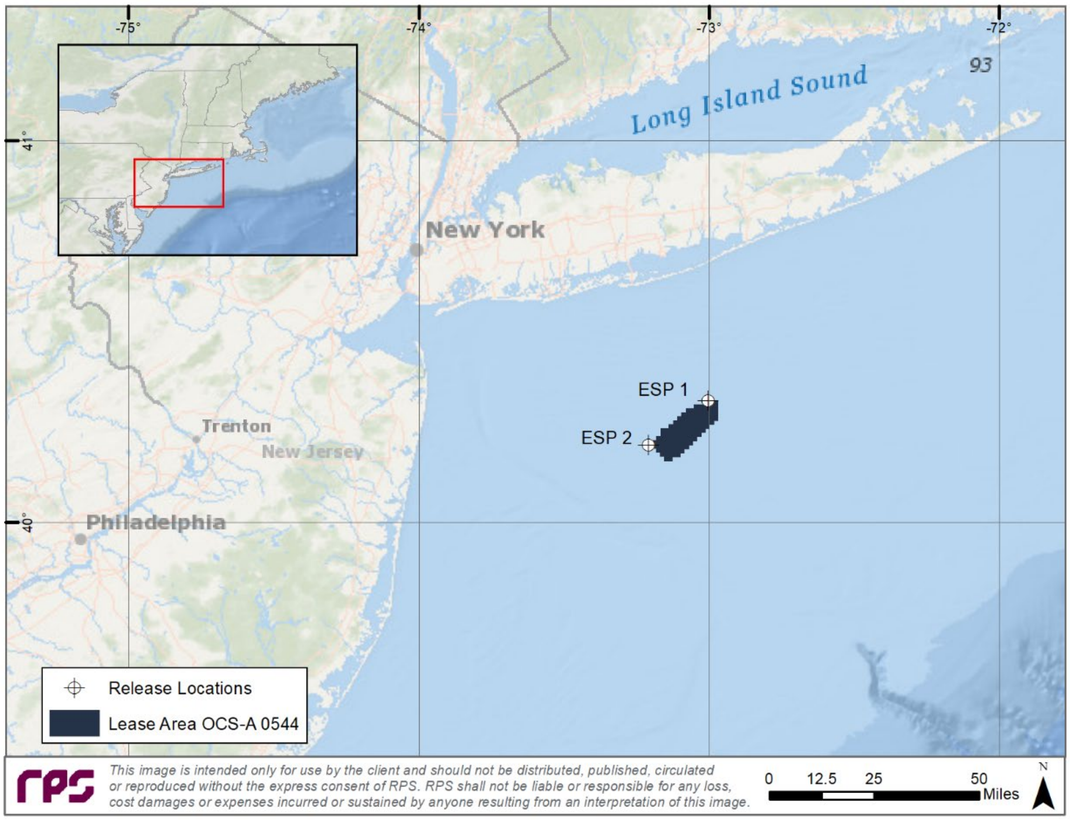


Figure 1. Oil spill modeling release locations and model domain defined for this study, south of Long Island, New York.

1.2 Objectives, Tasks and Study Output

The goals of spill modeling include projecting the probable behavior of accidentally spilled oil using a state-of-the-art three-dimensional (3-D) transport model and producing modeled trajectory and fate output such as visual representations (e.g., probability of oiling and minimum travel time maps) for various scenarios. RPS' proprietary oil spill modeling framework, OILMAP/SIMAP, was used for the simulations performed in this study. Model inputs included winds, currents, chemical composition, and properties of oils of interest, and specifications of the release (amount, location, etc.). The model was run in stochastic mode, as described further in Section 3, providing two types of information: (1) the footprint of sea surface and shoreline areas exposed to oil above a certain threshold of concern and the associated probability of oil contamination, and (2) the shortest time required for oil to reach any point within the areas predicted to be oiled.

Environmental conditions (i.e., wind and current forcing, water temperature, and salinity) play a critical role in the assessment of the trajectory and weathering of oil in a marine spill. Therefore, a data analysis of these conditions as input to the model was performed. The data analysis also helped to identify the site-specific seasons in which the modeling scenarios should be performed. As a result of this analysis, a total of eight stochastic modeling scenarios (one per season for two spill locations) were assessed.

This report describes the models, modeling approach, model inputs, and outputs used in this study. A description of environmental data sources is provided in Section 2. The oil spill modeling approach and scenario specifications are provided in Section 3. Section 4 provides a summary of the stochastic modeling results and conclusions. References are provided in Section 5.

2 ENVIRONMENTAL CONDITIONS AND DATA ANALYSIS

To understand the behavior of marine spills, it is necessary to analyze and evaluate the predominant environmental conditions in the area of interest. Winds and currents are the key forcing agents that control the transport and weathering of an oil spill. To reproduce the natural variability of the environment, the oil spill model (OSM) requires wind and current datasets that vary both spatially and temporally. Optimally, the minimum window of time for stochastic simulations is five to ten years; therefore, long-term records of wind and current data were obtained from the outputs of global numerical atmospheric and ocean circulation models for this study. The following sections describe the key environmental conditions that dominate in the region of interest and more specifically in the model domain. Figure 2 below presents the locations of environmental data collected for this study, as described in the following sections.

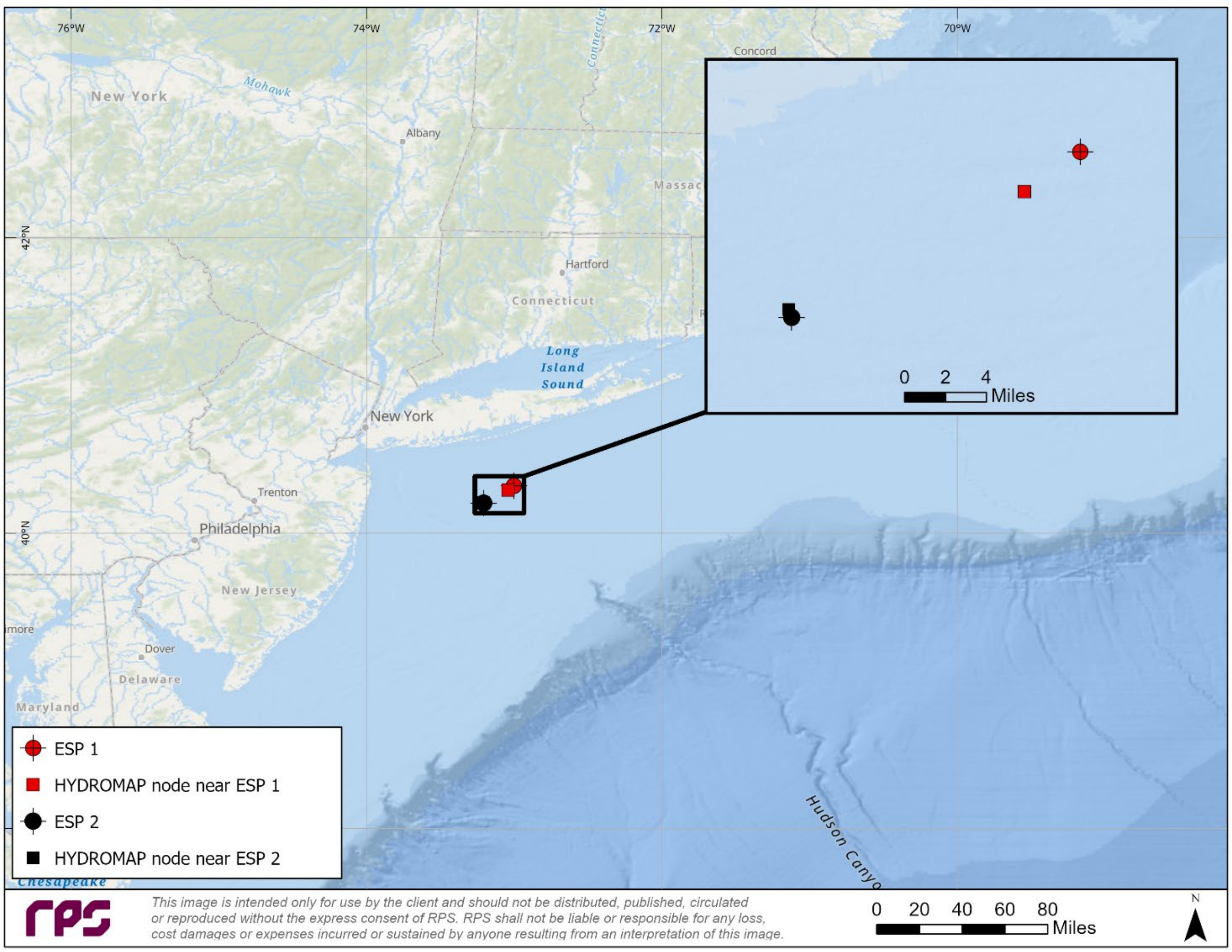


Figure 2. Hypothetical spill sites and relevant locations for this study, Northwest Atlantic.

2.1 General Dynamics and Climatology

The Area of Interest (AOI) for this study is located south of Long Island in the Mid-Atlantic Bight (MAB) region which extends from Cape Hatteras, North Carolina to Cape Cod, Massachusetts. The dynamics of this mean circulation is not entirely forced by the local wind stress. The observed mean circulation (Figure 3) flows westward/southwestward on the New England shelf, opposing the local wind stress. Lentz (2008) discussed that the depth-averaged along-shelf flow over the MAB is mainly driven by a balance between an along-shelf pressure gradient and mean wind stress (which acts in the opposite direction of pressure gradient force). Although the wind stress does not significantly impact the mean flow, it is important to note that the wind stress forces the near-surface offshore flow.

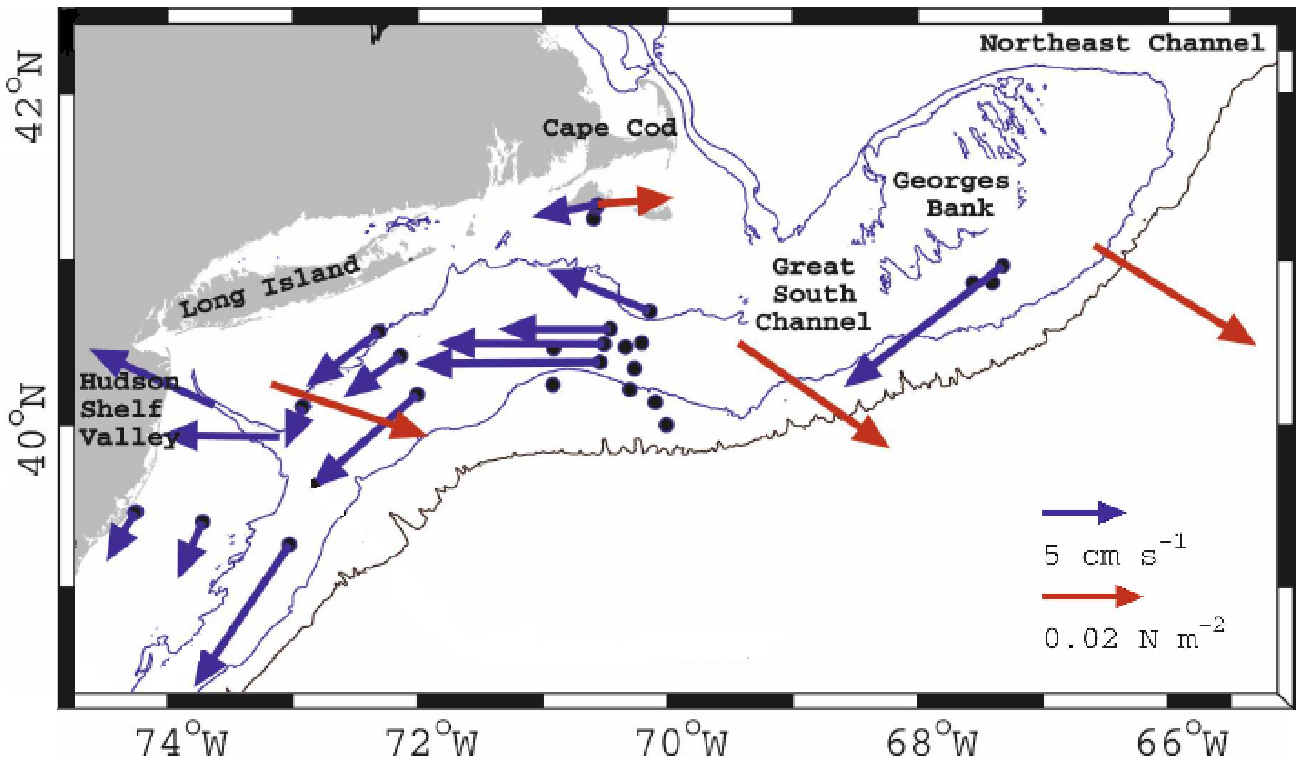


Figure 3. Map of the MAB showing mean depth-averaged current vectors in blue, and mean wind stress vectors in red based on observations (modified from Lentz 2008)

Wind speeds and directions throughout the MAB show seasonal variation. During the winter months, a northwesterly wind with mean wind stresses of ~0.07 newton per square meter (Nm^{-2}) is observed. In the summer months, the wind is predominantly from the southwest with mean wind stresses of ~0.02 Nm^{-2} (Lentz 2008). The shelf waters of the MAB also show a significant seasonal variation in terms of temperature and stratification (Beardsley et al. 1985). Because of strong surface heating and weak wind stresses during the summer months, the water remains warm and thermally stratified in this season. However, during the winter months, the water becomes cold and weakly stratified due to stronger wind stresses and surface cooling. Because of the river discharges in MAB, salinity near the coast is relatively low (32 ppt) compared to that of water near shelf break where salinity is about 34 ppt (Chapman and Beardsley 1989). A front located near the shelf break of MAB separates the cooler, fresher shelf water from the warmer, saltier slope water (Linder and Gawarkiewicz 1998).

Seasonal breakdown for OSM analysis is presented in Table 2, which is based on existing literature and the CFSR wind analysis (Figure 7 and Figure 8) at the spill sites.

Table 2. Seasonal breakdown for the spill sites.

Season	Representative Months	Season Description
Winter	December-February	Higher wind, predominately from west-northwest
Spring	March-May	Transition of wind direction from west-northwest to south-southwest with relatively lower wind speed than winter
Summer	June-August	Lower wind speed, predominantly from south-southwest
Fall	September-November	Transitional wind directions, from south-southwest to west-northwest with relatively higher wind speed than summer

Data obtained from the World Ocean Atlas climatology dataset (Zweng et al. 2018; Locarnini et al. 2018) near ESP 1 and ESP 2 show the monthly Sea Surface Temperature (SST) typically varies from 5°Celsius [C] (41°Fahrenheit [F]) to 22°C (72°F) (Figure 4). SST starts to increase from early spring and peaks during late summer. After this period, temperature decreases and drops to 5°C (41°F) in February. Sea Surface Salinity (SSS) predominately fluctuates between roughly 30.8 parts per thousand (ppt) and 32.8 ppt near ESP 1, and between 30.5 ppt and 32.5 ppt near ESP 2. Note that due to the similarities in SST and SSS, a figure is only provided at ESP 1 (Figure 4).

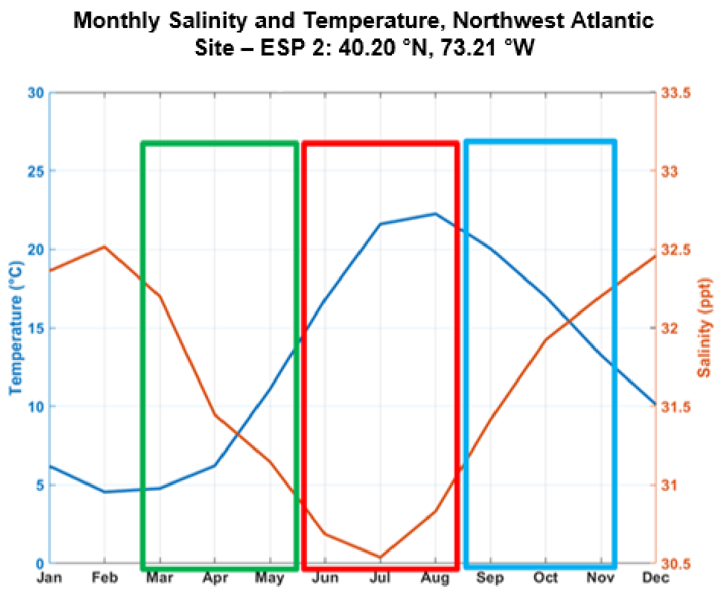


Figure 4. Monthly sea surface temperature (°C) in blue and salinity (ppt) in orange near ESP 1, Northwest Atlantic. Spring, summer and fall seasons are shown by green, red, and blue boxes, respectively.

2.2 Wind Dataset – NCEP CFSR

For this study, wind data were obtained from the U.S. National Centers for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) for a 5-year period (2006 to 2010; Table 3). The CFSR was designed and executed as a global, high-resolution, coupled atmosphere-ocean-land surface-sea ice system to provide the best estimate of the state of these coupled domains (Saha et al. 2010). This atmospheric model has a horizontal resolution of 38 km (24 mi), with 64 vertical levels extending from the surface to the height at which air pressure reaches 0.26 hectopascal (hPa). CFSR winds were also one of the main driving forces used in the HYCOM Reanalysis, the hydrodynamic currents dataset used in this study.

Table 3. The specifics of wind dataset used for the modelling.

Name of Dataset	CFSR
Coverage	80°W - 64°W
Owner/Provider	43°N – 33°N
Horizontal Grid Size	NCEP (US)
Hindcast Period	0.5° x 0.5°
Time Span	2006 – 2010

2.2.1 CFSR Analyses at the Spill Sites

As wind speeds and directions are very similar at both spill sites, only figures for ESP 1 are presented in this report. The wind figures (Figure 5 – Figure 8) for the spill sites were developed using a distance-weighted interpolation from the four surrounding CFSR nodes. The following figures provide a graphical description of the CFSR winds in this region, to understand their variability, both spatially and temporally:

- Figure 5 – Wind rose map: spatial distribution of CFSR annual wind roses over the area of interest,
- Figure 6 – Annual wind rose: annual CFSR wind rose at ESP 1,
- Figure 7 – Wind speed statistics: monthly average and 95th percentile CFSR wind speed statistics at ESP 1, and
- Figure 8 – Monthly wind roses: monthly CFSR wind roses at ESP 1.

All figures display wind data in the meteorological convention. Roses indicate the direction which winds are blowing *from* in meters per second (m/s).

Based on this global wind dataset, the following conclusions can be drawn:

- Near the spill sites in the Northwest Atlantic, winds are predominantly blowing from the west-northwest (winter) and south-southwest (summer) sectors.
- Monthly average wind speeds ranges from 5 to 9 m/s (10 to 17 knots [kn]) at ESP 1, with the weakest winds found during summer. The 95th percentile wind varies between 10 and 15 m/s (19 to 29 kn) and reaches maximum during winter.
- Winds are mostly consistent during winter and summer in terms of direction and speed. During winter (December through February), wind is predominantly west-northwesterly with higher speed while throughout summer (June through August), it is mostly south-southwesterly with lower speed. Spring (March through May) and fall (September through November) are the transitional seasons. Spring marks the period when predominant wind direction changes from west-northwest to south-southwest and average wind speed decreases, while in fall the predominant wind direction transitions with relatively increased wind speed.

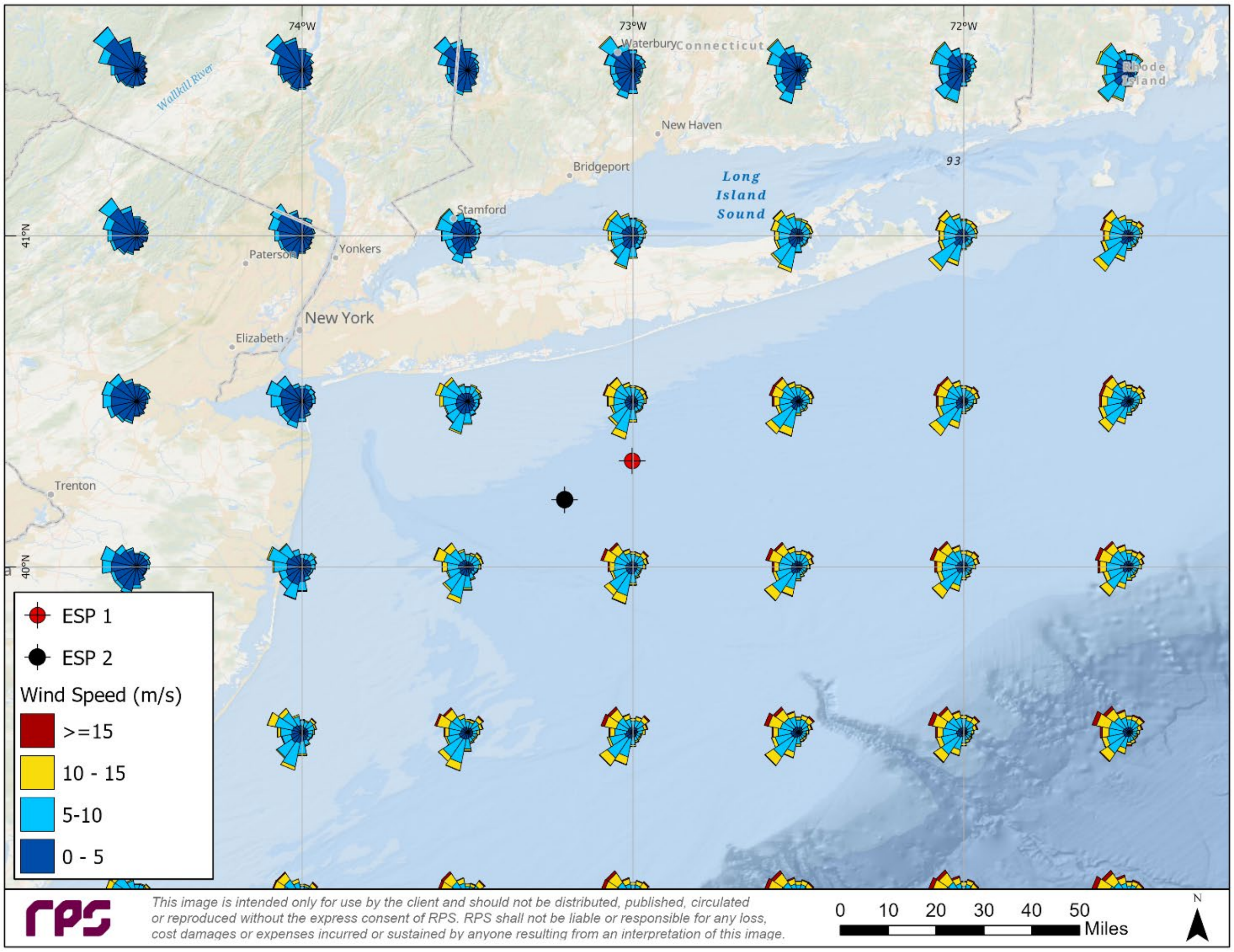


Figure 5. Spatial distribution of CFSR annual wind speed and direction near the spill sites, Northwest Atlantic (in m/s).

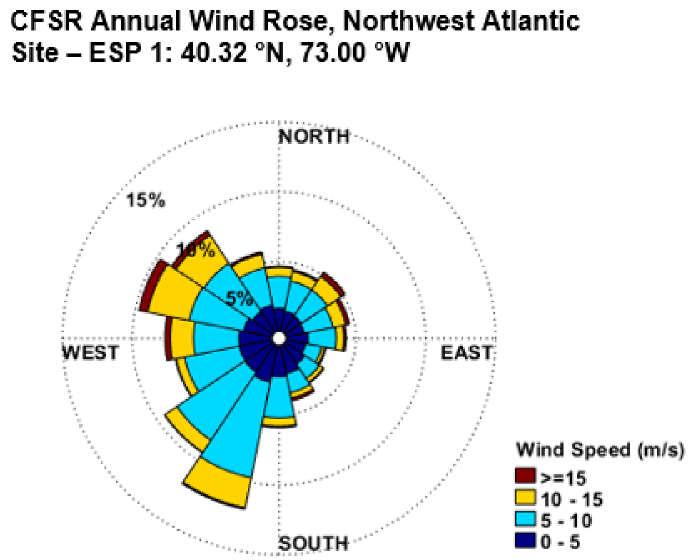


Figure 6. Annual CFSR rose near ESP 1, Northwest Atlantic. Wind speeds in m/s, using meteorological convention (i.e., direction wind is coming from).

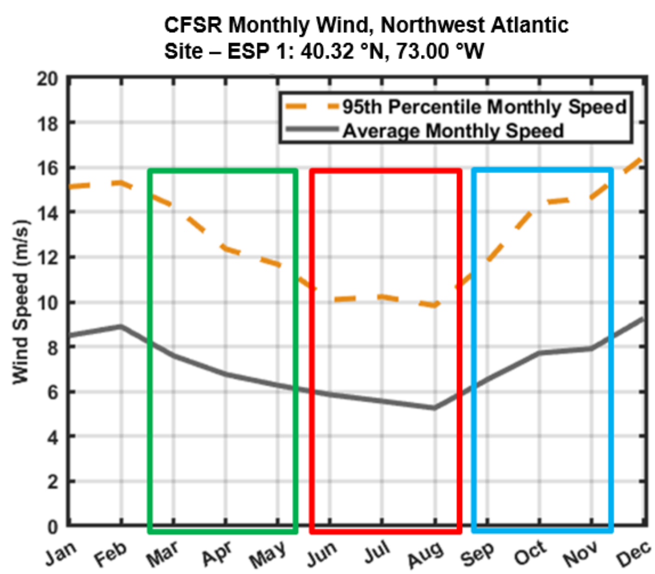


Figure 7. Monthly average and 95th percentile CFSR wind speed statistics near ESP 1: monthly average (grey solid) and 95th percentile (orange dashed); wind speed reported in m/s. Spring, summer, and fall are shown by green, red and blue boxes, respectively.

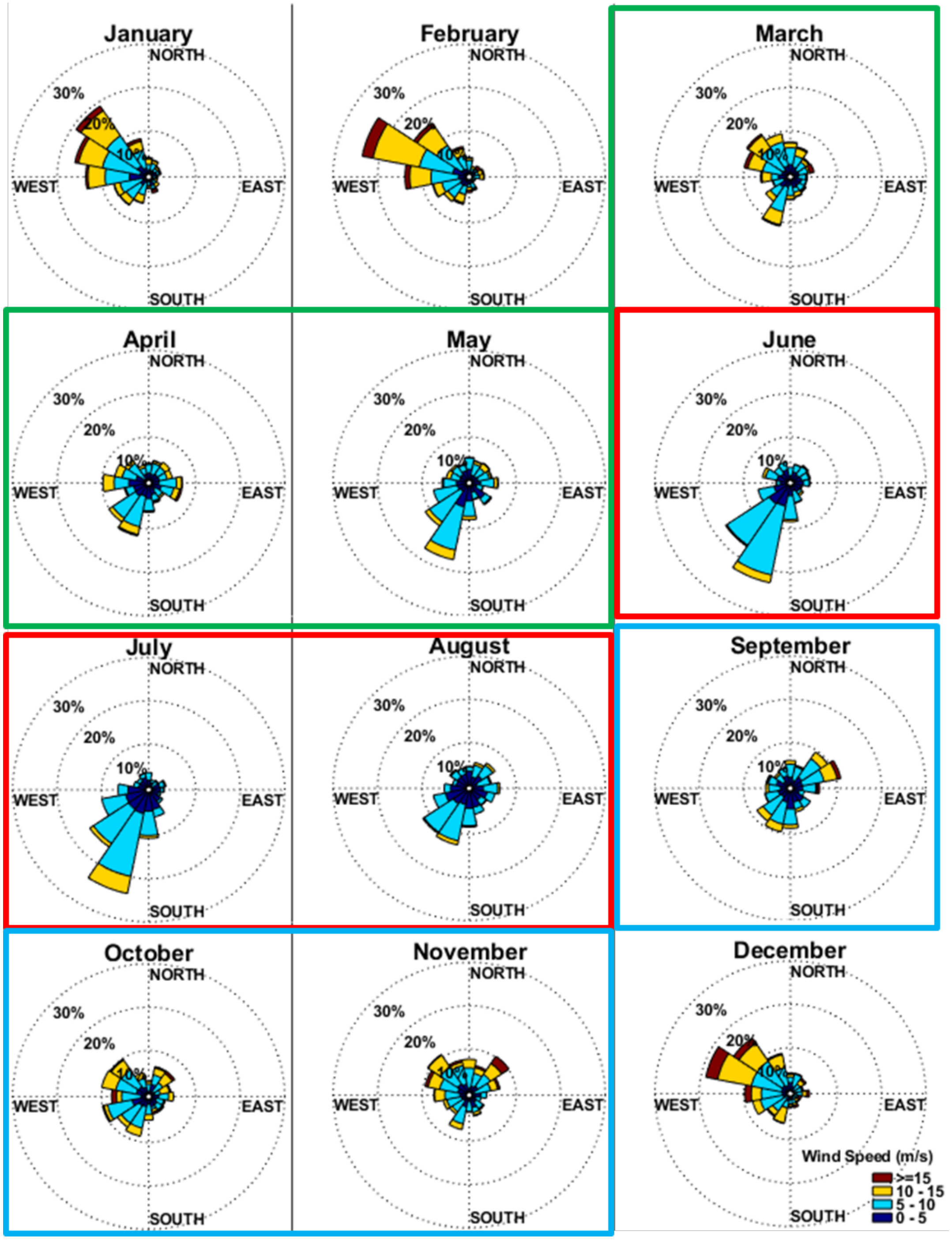


Figure 8. Monthly CFSR wind roses near ESP 1. Wind speeds are in m/s, using meteorological convention (i.e., direction wind is coming from). Spring, summer, and fall are shown by green, red, and blue boxes, respectively.

2.3 Current Datasets

To capture the complex nature of regional and coastal circulation for the area of study, two different current datasets have been combined in this modeling study: a regional hindcast dataset capturing general mesoscale circulation, and a higher resolution dataset developed for this project to capture tidal circulation important in coastal areas (Table 4).

Table 4. The specifics of the current datasets used for the modeling.

	Residual	Regional Tidal
Name of Dataset	HYCOM (GLBu0.08/ expt_19.1)	HYDROMAP
Owner/Provider	Naval Research Laboratory (USA)	RPS
Bathymetry	GEBCO	GEBCO
Wind Forcing	CFSR (US)	-
Tides	-	TPXO 7.2
Horizontal Grid Size	~9 km (6 mi)	~1–7 km (0.6–4 mi)
Hindcast Period	2006 - 2010	Periodic tidal constituents' phase and amplitude
Output Frequency	Daily	30-minute processing

2.3.1 Global Current dataset – HYCOM Reanalysis

Current data were obtained from the HYCOM (Hybrid Coordinate Ocean Model) hindcast reanalysis, a 1/12-degree global simulation assimilated with NCODA (Navy Coupled Ocean Data Assimilation) from the US Naval Research Laboratory (Halliwell 2004). This dataset (Table 4) captures the oceanic large-scale circulation in the study area. NCODA uses the model forecast as a first guess in a three-dimensional (3D) variational scheme and assimilates available satellite altimeter observations from the Naval Oceanographic Office (NAVOCEANO) Altimeter Data Fusion Center, in-situ Sea Surface Temperature (SST), and available in-situ vertical temperature and salinity profiles from XBTs (Expendable Bathythermographs), Argo floats, and moored buoys. Details of the data assimilation procedure are described in Cummings and Smedstad (2013) and Cummings (2005). The forcing for the model come from the US National Centers for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR, Saha et al. 2010). Ocean dynamics, including geostrophic and wind driven currents, are reproduced by the model. The most recent reanalysis experiment (GLBu0.08/expt_19.1) includes data between August 1, 1995 and December 31, 2012. However, as this version of HYCOM does not include tidal information, a separate model (HYDROMAP Tidal Model) was used to supplement HYCOM and generate tidal currents.

2.3.2 Tidal Currents – HYDROMAP Tidal Model

HYDROMAP, a hydrodynamic model developed by RPS, was used to simulate local circulation from tides for this study. HYDROMAP is a globally re-locatable three-dimensional hydrodynamic model (Isaji et al. 2001a, 2001b) capable of simulating complex circulation patterns driven by tidal forcing, wind stress, and freshwater flows. HYDROMAP employs a novel stepwise-continuous-variable-rectangular gridding strategy with up to six levels of resolution. The term “stepwise continuous” implies that the boundaries between successively smaller and larger grids are managed in a consistent integer step. HYDROMAP has been applied in numerous sediment dispersion and transport studies in the U.S. and worldwide.

HYDROMAP can be used to make constant, cyclical, or time varying current fields. The constant and cyclical current fields are generated for each component of the circulation separately, whereas the time varying current fields represent the integration of all components simultaneously for a specific timeframe. Tidal currents generated from the HYDROMAP model were then combined with the HYCOM circulation to present a complete hydrodynamic dataset for the area. A brief description of the model application to the AOI is provided in Section 2.3.2.1.

2.3.2.1 HYDROMAP Model Application to the Area of Interest

A model grid of the study area was developed with grid resolution (1–7 km [0.6–4.3 mi]) sufficient to capture shoreline and bathymetric features over the expected area of potential oil spill impacts, and to capture the scale, tidal circulation features (Figure 9 and Figure 11). The grid was developed for the area off the coast of New England as well as the area adjacent to Long Island. The model grid cells were assigned depth based on the General Bathymetric Chart of the Oceans (GEBCO; Jones 1994). An illustration of the model grid is shown in Figure 9.

The hydrodynamic model simulations were forced with tides, based on the global Oregon State University (OSU) TOPEX/Poseidon Global Inverse Solution TPXO (Egbert and Erofeeva 2002), which is a global model used for predicting harmonic constituent of ocean tides. The tidal boundary conditions were applied along the open boundaries of the grid (Figure 9) and were characterized based on 8 harmonic constituents (M2, S2, N2, K2, K1, O1, P1 and Q1) which comprise the majority of the tidal energy in the area.

Tidal constituent phase and amplitude from OSU TPXO model grid cells were interpolated to the HYDROMAP boundary cells. Both phase and amplitude vary continuously along the boundaries. The phase is the timing at which the maximum elevation caused by that constituent occurs relative to a base case equilibrium tide; amplitude refers to the height that the water level may be either above or below mean sea level.

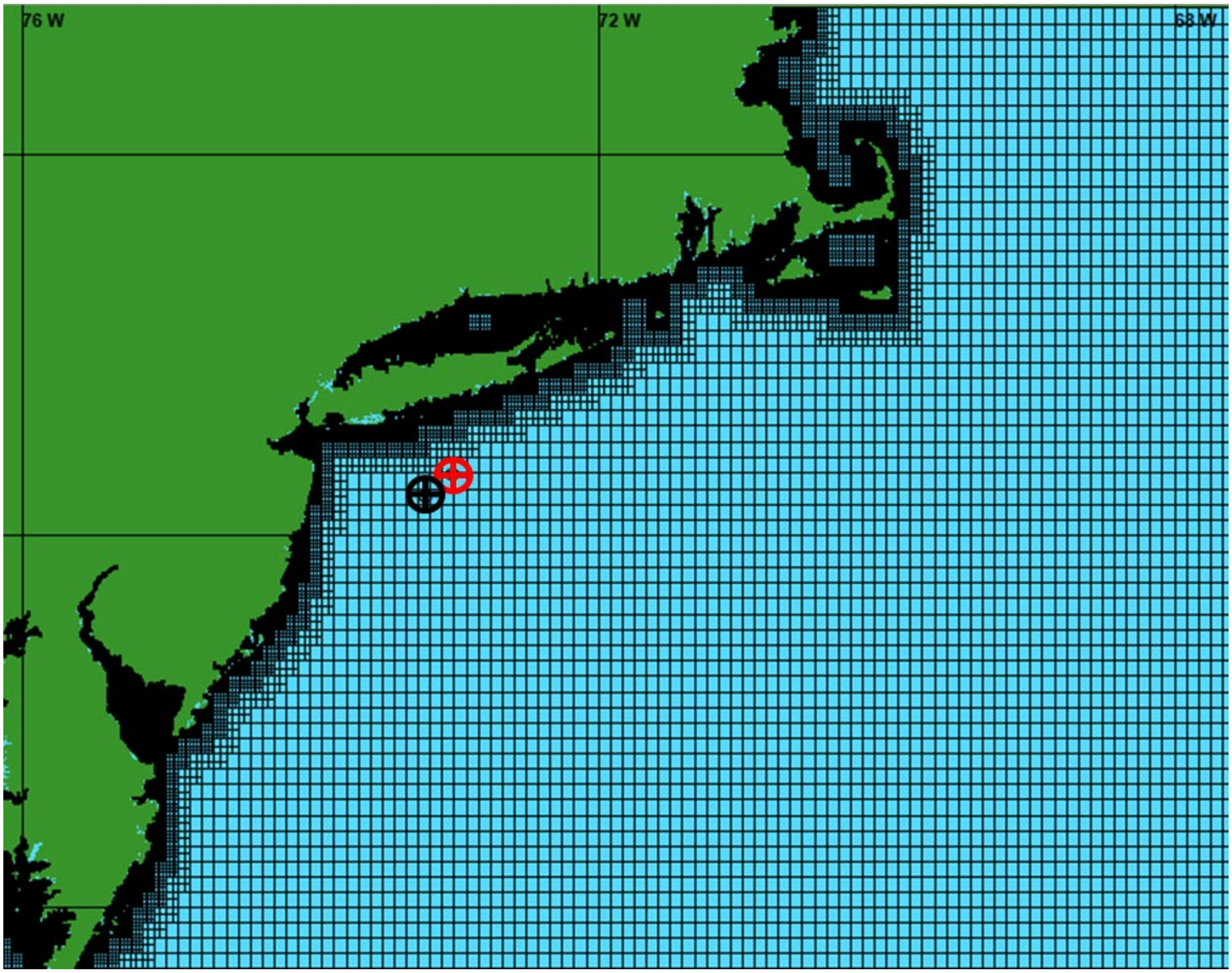


Figure 9. Illustration of the HYDROMAP model grid near the spill sites. Red mark shows ESP 1, and black mark shows ESP 2.

2.3.2.2 Hydrodynamic Model Simulation Results

The HYDROMAP model application was used to generate tidal circulation data for use in the OSM scenarios. The tidal constituents result in variable current speeds due to the timing of individual constituents. In the AOI, the semi-diurnal constituents dominate the tidal regime which results in reversing currents twice a day. As phase and amplitude of tide are very similar at both spill sites, only the figure for ESP 1 is presented in this report (Figure 10).

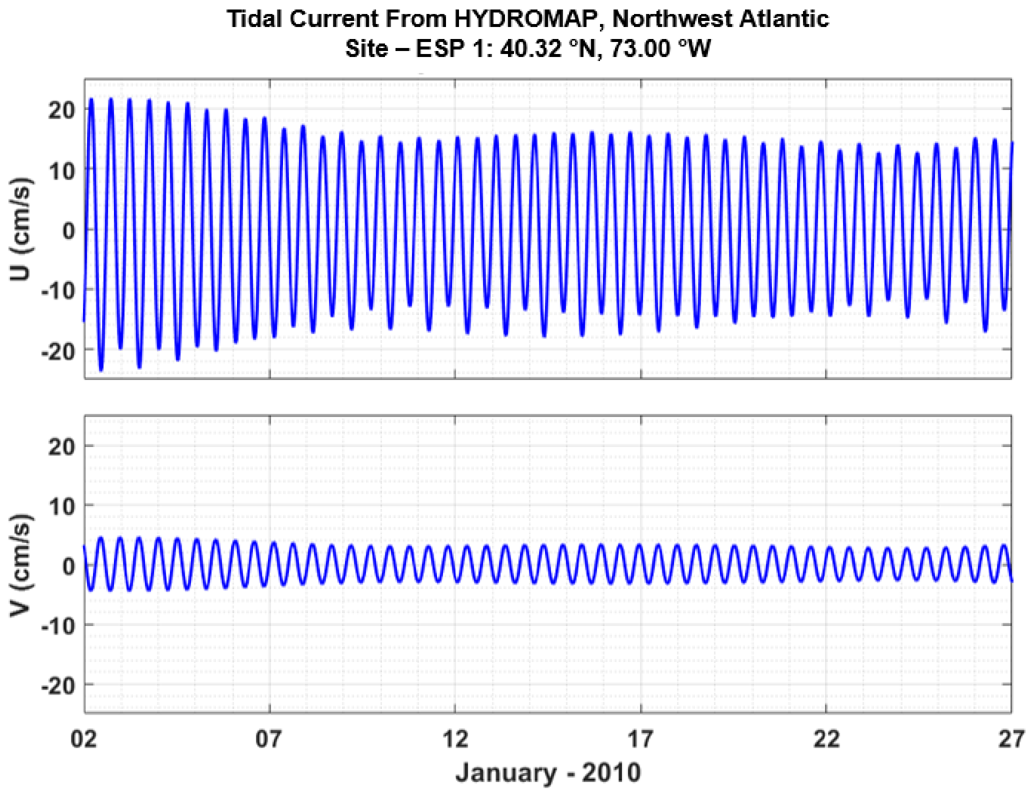


Figure 10. Time series of U and V component of tidal current from HYDROMAP near ESP 1.

Snapshots of typical flood and ebb circulation patterns of the combined constituents in the study area are shown in Figure 11. The model predictions show tidal influence near the spill sites with tidal current aligned with the west-northwest and east-southeast directions.

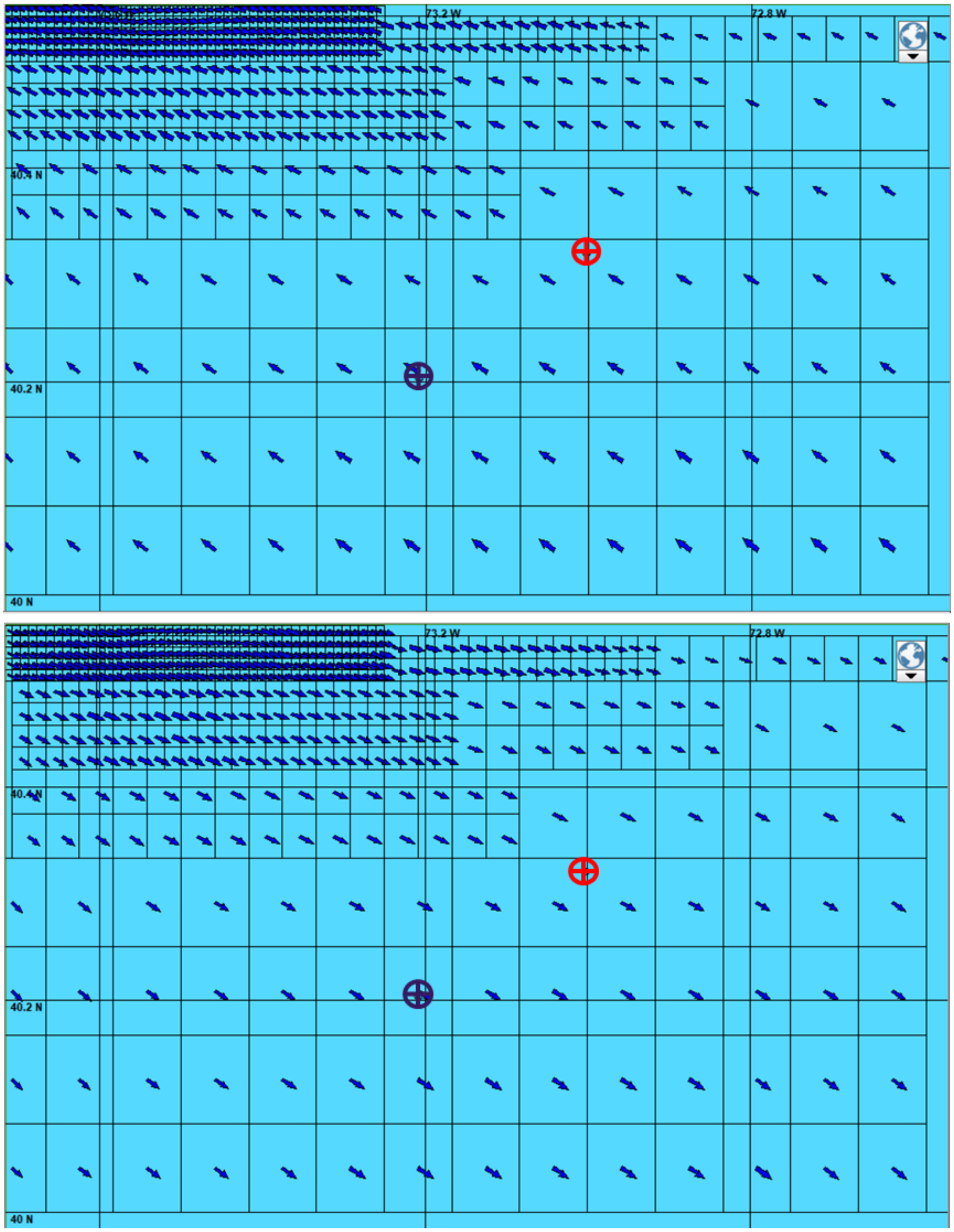


Figure 11. Illustration showing flood (upper panel) and ebb (lower panel) current patterns near ESP 1 and ESP 2 showed by red and black marks, respectively.

2.3.3 Current Analysis: HYCOM + HYDROMAP

Daily HYCOM files were augmented with a HYDROMAP tidal hydrodynamics file as explained in the previous chapter, at a temporal resolution of 30 minutes. For this study, a 5-year period of daily HYCOM model output was collected (2006 to 2010) and combined with the tidal model predicted datasets.

As current speeds and directions are very similar at both spill sites, only figures for ESP 1 are presented in this report. The figures (Figure 12–Figure 16) were developed using a distance-weighted interpolation from the four surrounding HYCOM nodes. The following figures describe the variability of current speed and direction near ESP 1 based on the hydrodynamic dataset:

- Figure 12– Current intensity and direction map: spatial distribution of HYCOM-averaged surface current speeds and current directions in the area of interest;
- Figure 13– Annual current rose: annual HYCOM + HYDROMAP surface current rose at ESP 1;
- Figure 14– Monthly current speed statistics: monthly average and 95th percentile HYCOM + HYDROMAP current speed at ESP 1;
- Figure 15– Monthly current roses: monthly HYCOM + HYDROMAP surface current roses at ESP 1; and
- Figure 16– Vertical profile of horizontal current speed: annual average and 95th percentile of HYCOM + HYDROMAP horizontal current speed variation with depth at ESP 1, and the current roses for different water depths.

All figures display current data in the oceanographic convention. Roses indicate the direction which currents are flowing *towards* in centimeters per second (cm/s).

Based on the analysis of this regional data, the following conclusions can be drawn:

- HYCOM-averaged surface current speeds near the spill sites and yearly average current rose show that current is mainly traveling eastward with moderate speed.
- Monthly average current speed at ESP 1 varies at approximately a mean of 20 cm/s (0.4 kn) while the 95th percentile current oscillates approximately between 35 and 49 cm/s (0.7 and 1 kn).
- Currents at ESP 1 show some seasonal variabilities. Predominant current direction is southeastward/east-southeastward during winter (December through February) and eastward/east-northeastward during summer (June through August). Spring (March through May) and fall (September through November) are the transitional seasons.
- The vertical profile at ESP 1 shows the average and 95th percentile current speed decreases from the surface to the bottom layer from approximately 20 cm/s (0.4 kn) and 40 cm/s (0.8 kn) to 12 cm/s (0.2 kn) and 22 cm/s (0.4 kn), respectively. The predominant current direction shifts from eastward at the surface to west-northwest and east-southeast alignment at the mid-layer and the bottom layer.

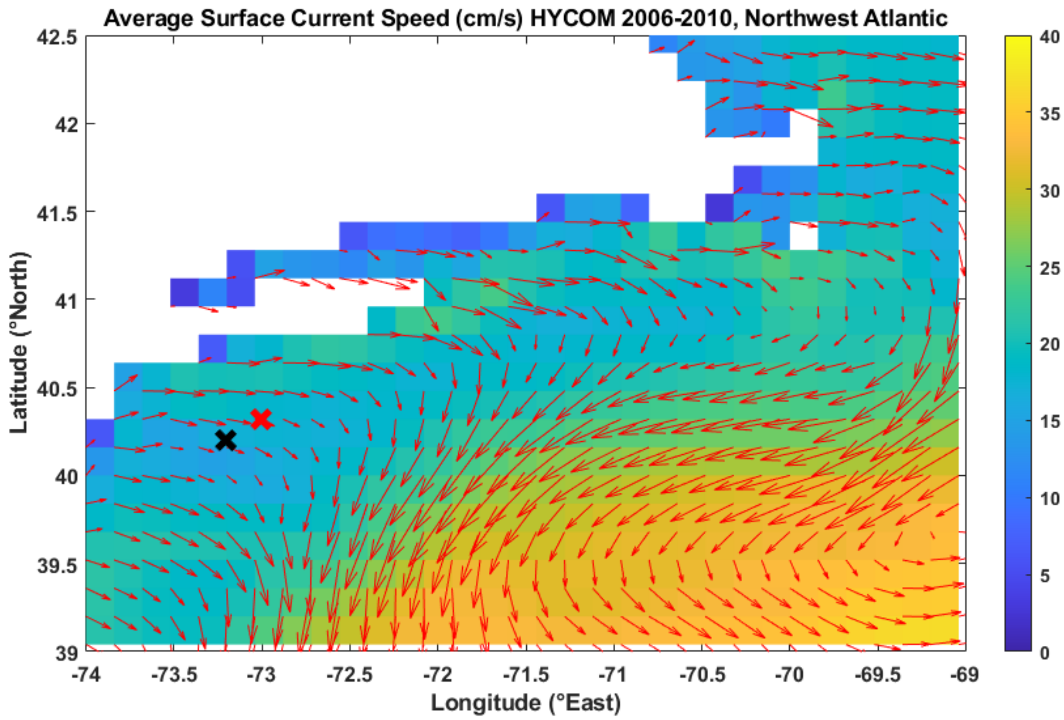


Figure 12. HYCOM surface current speed averaged over 2006-2010, Northwest Atlantic. Red and black "X"s indicate location of representative spill sites ESP 1 and ESP 2, respectively.

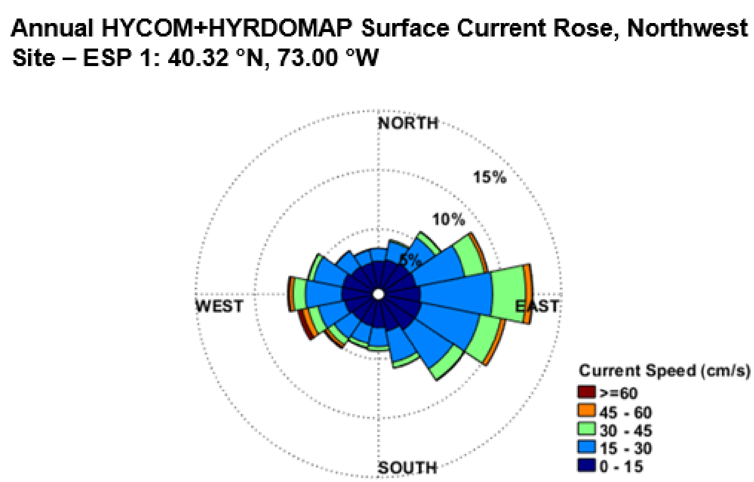


Figure 13. Annual HYCOM + HYDROMAP rose near ESP 1, Northwest Atlantic for 2006-2010. Current speeds in cm/s, using oceanographic convention (i.e., direction current is going towards).

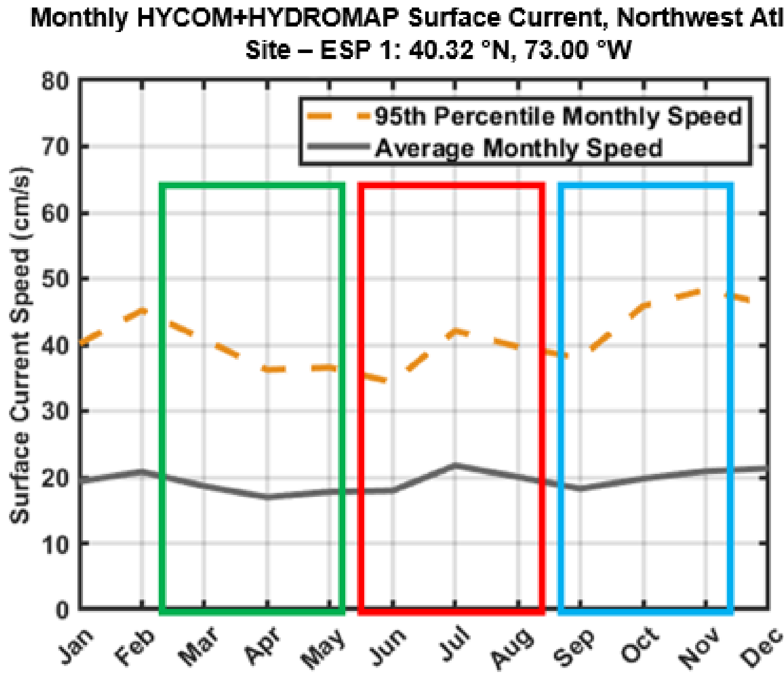


Figure 14. Monthly average and 95th percentile HYCOM + HYDROMAP current speed statistics near ESP 1, Northwest Atlantic for 2006-2010: monthly average (grey solid) and 95th percentile (orange dashed); current speed reported in cm/s. Spring, summer, and fall are shown by green, red, and blue boxes, respectively.

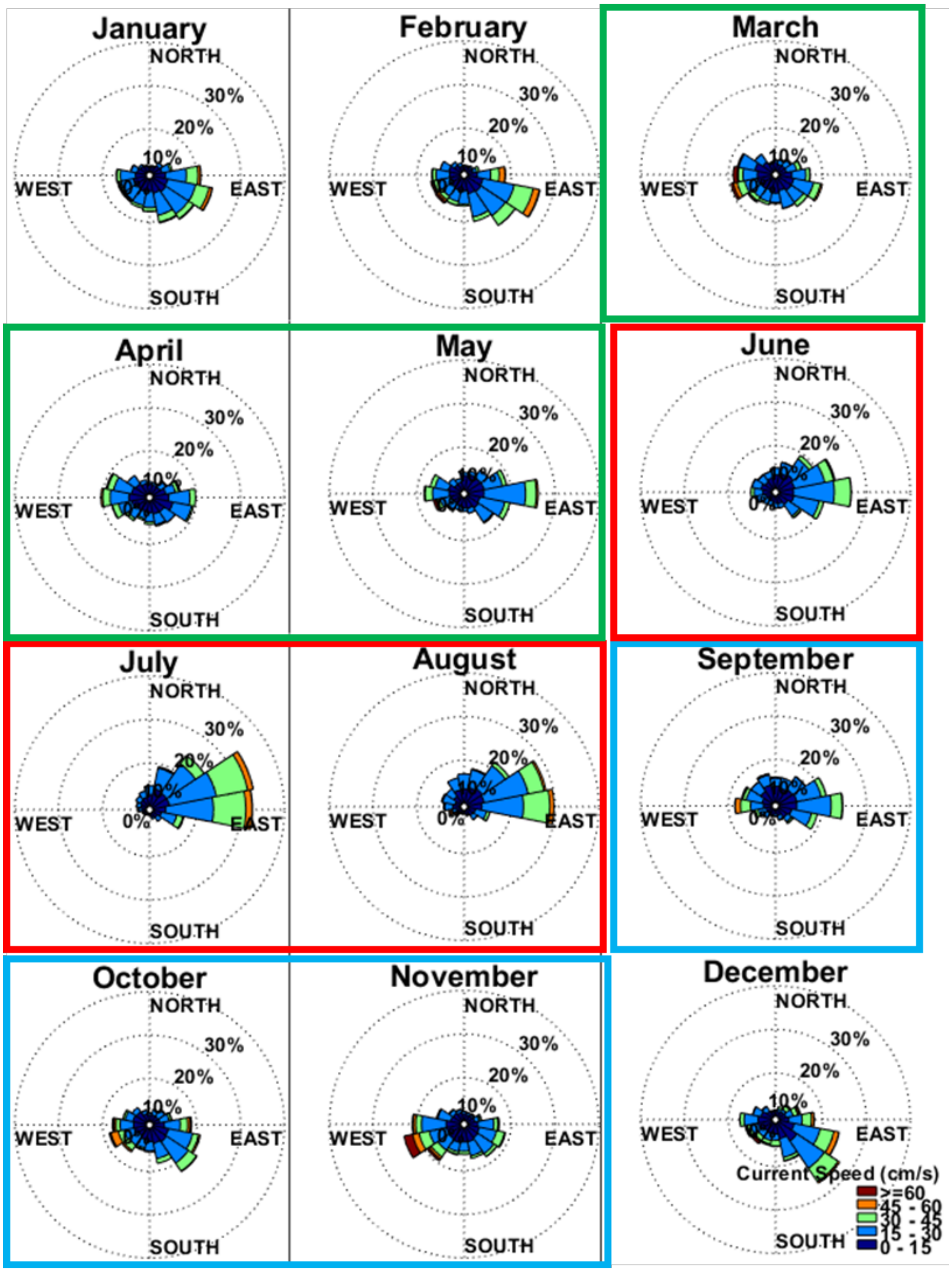


Figure 15. Monthly HYCOM + HYDROMAP surface current roses near ESP 1, Northwest Atlantic for 2006-2010; following oceanographic convention (currents heading towards), current speeds in cm/s. Spring, summer, and fall seasons are shown by green, red, and blue boxes, respectively.

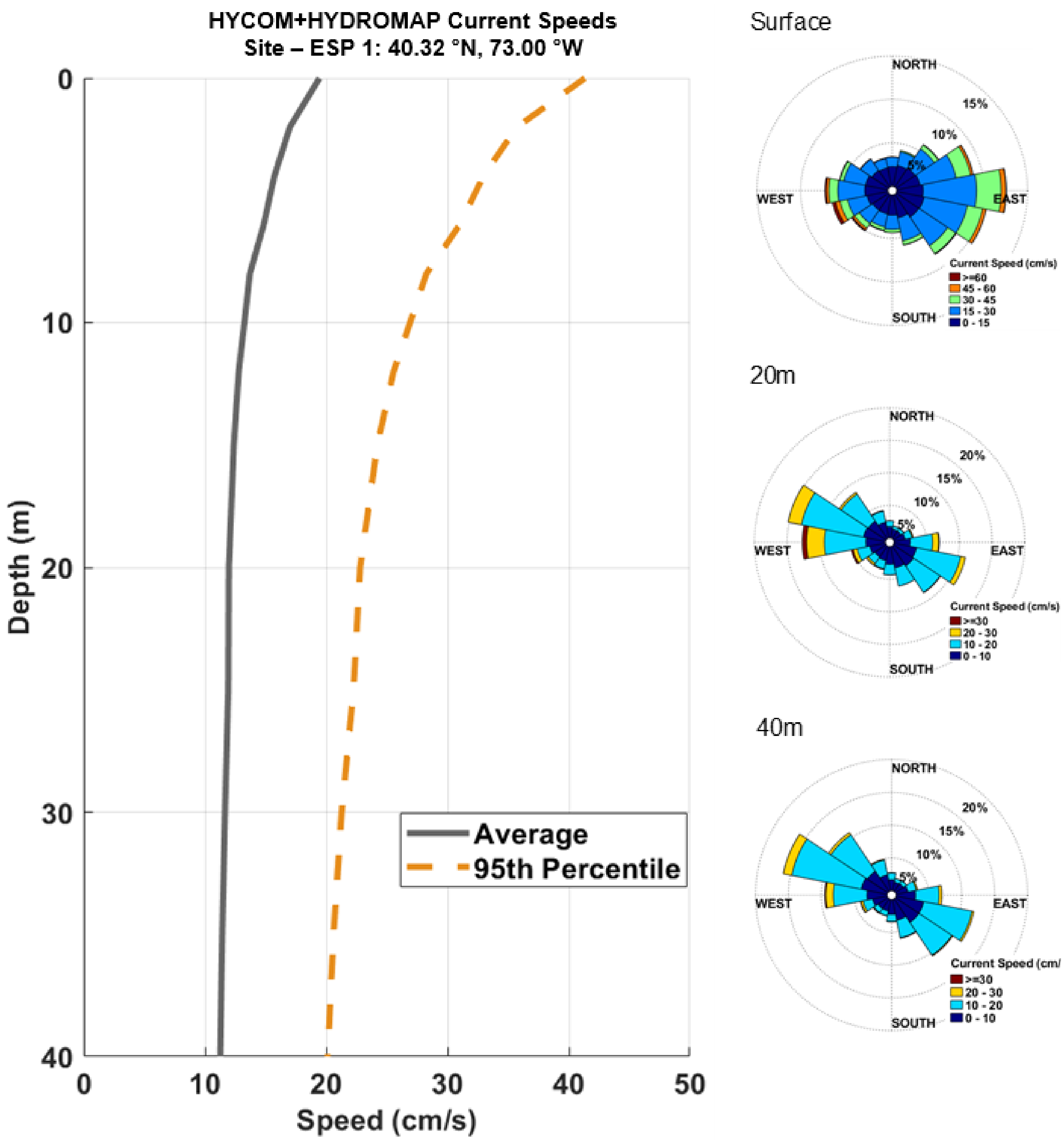


Figure 16. HYCOM average (solid grey) and 95th percentile (dashed orange) of horizontal current speed (cm/s) dataset from 2006-2010, variation with depth near ESP 1; and the current roses at surface, 20 m, and 40 m water depths. The roses show the direction towards which the current is flowing.

2.4 Surface Transport

To compare the potential for surface wind-driven transport versus current-driven transport, an assessment of the wind drift speed versus current speed was performed at ESP 1 and ESP 2, as shown in Figure 17. For this study, the wind drift was estimated to be 3.5% of the wind speed. As wind and current speeds are very similar at both spill sites, only figures for ESP 1 are presented in this report. Based on this analysis at ESP 1, current is the primary agent of the surface transport during July and August. However, for the rest of the year wind drift controls the movement of the surface floating slicks.

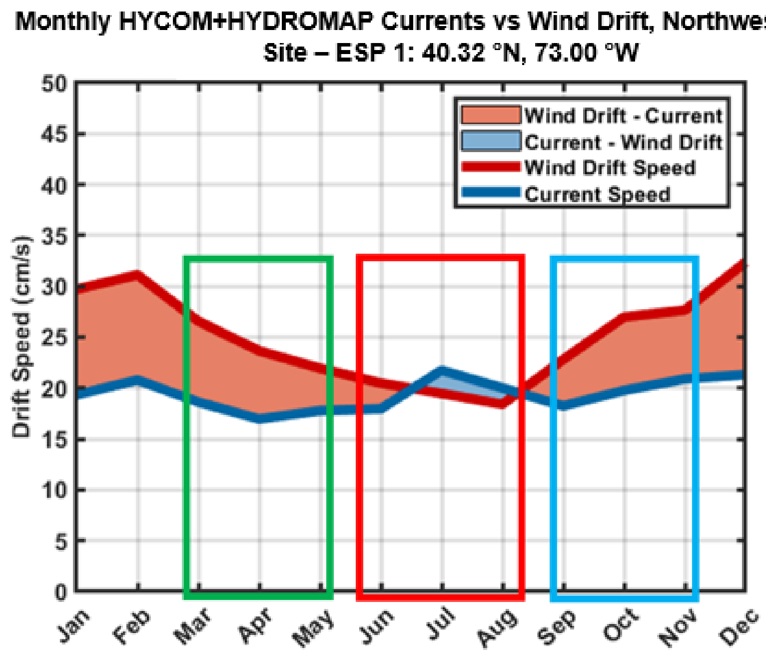


Figure 17. Surface drift forcing statistics near ESP 1: monthly-averaged CSFR wind drift compared with HYCOM + HYDROMAP current speed. Wind drift is calculated to be 3.5% of the wind speed. Predominant current transports are shaded blue and predominant wind drift is shaded pink. Spring, summer, and fall are shown by green, red, and blue boxes, respectively.

3 OIL SPILL MODELING SETUP

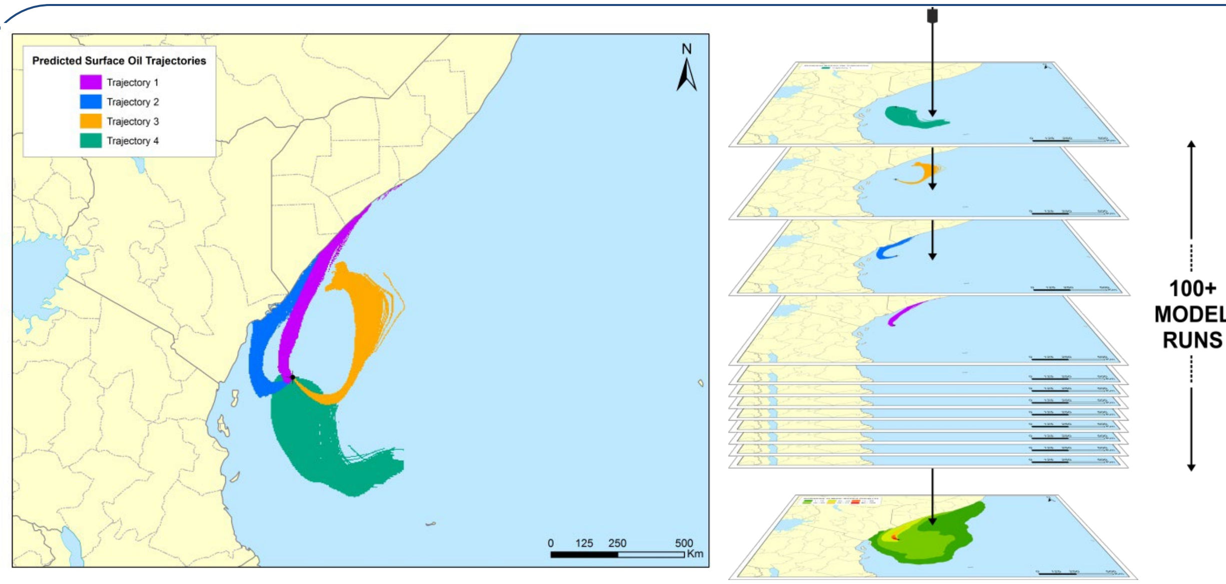
3.1 Modeling Methodology

RPS' proprietary oil spill modeling framework, OILMAP/SIMAP, was used for all simulations performed in this study. The model quantifies the transport and fate of different components of hydrocarbon mixtures through different compartments of the marine environment over time. The modeling system uses a 3-D Lagrangian model where each component of the spilled oil (floating, dispersed, shoreline, etc.) is represented by an ensemble of independent mathematical particles or "spillets". Each spillet comprises a subset of the total mass of hydrocarbons spilled and is transported by both currents and surface wind drift. Additional information on the modeling system is contained in Appendix A.

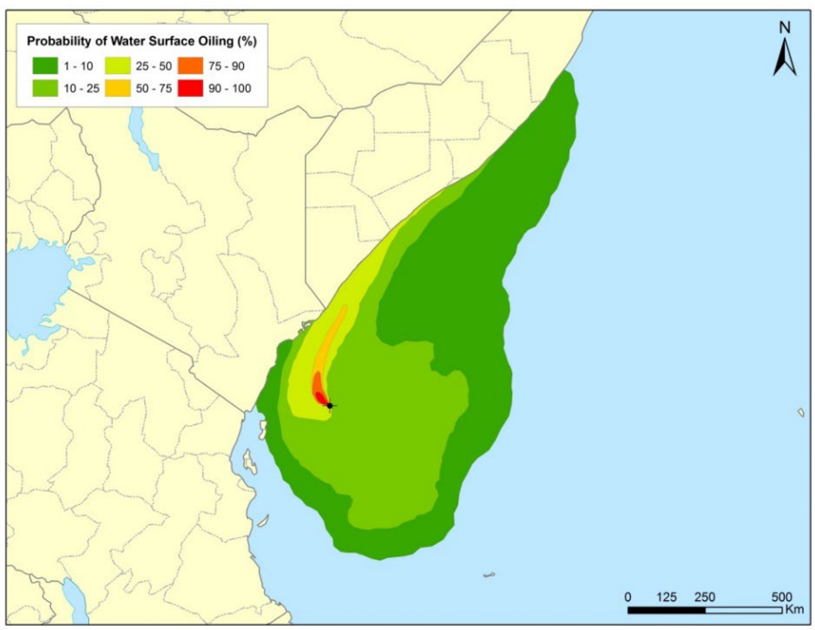
Stochastic Simulations

Stochastic simulations provide insight into the probable behavior of potential oil spills in response to temporally- and spatially-varying meteorological and oceanographic conditions in the study area. The stochastic model computes surface trajectories for an ensemble of hundreds of individual cases for each spill scenario, thus sampling the variability in regional and seasonal wind and current forcing by starting the simulation at different dates within the timeframe of interest.

The stochastic analysis provides two types of information: (1) the footprint of sea surface and shoreline areas exposed to oil above a certain threshold of concern and the associated probability of oil contamination, and (2) the shortest time required for oil to reach any point within the areas predicted to be oiled. The areas and probabilities of oiling are generated by a statistical analysis of all the individual stochastic runs (Figure 18). It is important to note that a single run will encounter only a relatively small portion of this footprint. In addition, the simulations provide shoreline oiling data expressed in terms of minimum and average times for oil to reach shore, and the percentage of simulations in which oil is predicted to reach shore. Results from this modeling step are presented in Section 4.



Examples of four individual spill trajectories predicted by OILMAP/SIMAP for a particular spill scenario. The frequency of contact with given locations is used to calculate the probability of impacts during a spill. Essentially, all 100+ model runs are overlain (shown as the stacked runs on the right) and the number of times that a trajectory reaches a given location is used to calculate the probability for that location.



Probability of surface oil exceeding a given threshold for the example scenario. This figure overlays 100+ individual model runs to calculate the percentage of runs that caused oiling above the threshold in a given area. This figure does not depict the areal extent of a single model run/spill.

Figure 18. Diagram of RPS stochastic modeling approach; an ensemble of individual trajectories creates the stochastic probability footprint.

3.2 Thresholds of Concern and Weathering

The stochastic approach applied in the spill risk assessment provided an evaluation of the likelihood of exposure to oil above ecological thresholds of concern, expressed as mass per unit area and concentration. The thresholds listed in Table 5 were used in the stochastic analysis, and followed a similar methodology as used in BOEM's previous study assessing potential catastrophic oil spills from offshore wind structures (Bejarano et al. 2013).

In addition to the standard thresholds of concern, 0.05 mm (0.002 in) was also modeled in this study. A threshold of 0.05 mm (0.002 in) is an **industry standard** surface oil thickness for recoverable oil. Oil must be of a certain thickness for oil spill response countermeasures to be effective. In mechanical recovery operations, oil must be above this thickness for skimmers to be able to collect the oil from the water surface. At thicknesses below this level, oil would appear as a silver or rainbow sheen, and skimmers would be very ineffective at recovering any of the oil. For surface dispersant application, many factors beyond oil thickness impact the effectiveness of this response method, including dispersant to oil ratio, dispersant application rate, wind speed, oil type, and oil viscosity (over time as it emulsifies). However, the surface oil thickness is also a critical measurement to ensure the dispersant can be most effective on the slick. Dispersants would not be effective on areas of sheen. In situ burning is an additional oil spill response countermeasure that is impacted by surface oil thickness. For a burn to ignite and sustain on the water, the slick must be approximately 2 mm (0.08 in) thick. The accepted standard of 0.05 mm (0.002 in) surface oil thickness allows responders to consider the most effective of these countermeasures given the specific oil spill scenario.

Surface oil thickness is typically associated with visual appearance by aerial observation for responders (NRC 1985; Bonn Agreement 2009, 2011; NOAA, 2016; Table 6; Figure 19). As an example, barely visible sheens may be observed above 0.04 µm (1×10^{-6} in), and silver sheens correspond with surface oil thickness of approximately 0.3 µm (1×10^{-5} in). Crude and heavy fuel oils greater than 1 mm (0.04 in) thick typically appear as black oil while light fuels and diesels that are greater than 1 mm (0.04 in) thick may appear brown or reddish. Because of the differences between oils and their degree of weathering, floating oil will not always have the same appearance. As oil weathers, it may be observed in the form of scattered floating tar balls and tar mats where currents converge. Typically, oil slicks in the environment would be observed as a range of visual appearances including silver sheen, rainbow sheen, and metallic areas simultaneously, as a combination of thicknesses may be present (Table 6; Figure 19). Thus, a model result presented as average oil mass per unit area or "thickness" is actually a region with patches of oil of varying thickness, which when distributed evenly in the area of interest, would be on average a certain thickness.

Table 5. Oil thickness thresholds applied in the spill risk assessment for sea surface and shoreline probability determinations.

Threshold Type	Average Concentration Threshold	Rationale	Visual Appearance	References
Oil on Sea Surface	10 g/m^2 ≈ 10 µm (0.01 mm) on average over the grid cell	**Ecological:** Observed lethal effects to birds on water at this threshold. Sublethal impacts to marine mammals, sea turtles, and floating Sargassum mats.	Fresh oil at this thickness corresponds to a slick being a dark brown or metallic sheen.	French et al. 1996; French McCay 2009; French McCay et al. 2011; French McCay et al. 2012; French McCay 2016
Oil on Sea Surface	50 g/m^2 ≈ 50 µm (0.05 mm) on average over the grid cell	An **industry standard** surface oil thickness for recoverable oil.	Heavy metallic sheen with patches of discontinuous brown oil	N/A
Shoreline Oil	100 g/m^2 ≈ 100 µm (0.1 mm) on average over the grid cell	**Ecological:** This is a screening threshold for potential ecological effects on shoreline flora and fauna, based upon a synthesis of the literature showing that shoreline life has been affected by this degree of oiling. Sublethal effects on epifaunal intertidal invertebrates on hard substrates and on sediments have been observed where oiling exceeds this threshold. Assumed lethal effects threshold for birds on the shoreline.	May appear as black opaque oil.	French et al. 1996; French McCay 2009; French McCay et al. 2011; French McCay et al. 2012**;** French McCay 2016

Table 6. Oil appearances based on NOAA (2016), Bonn (2009, 2011), and Lewis (2007).

Code	Description	Layer-Thickness			Concentration	
		microns (µm)	**millimeters (mm)**	**Inches (in.)**	**m^3 per km^2**	**bbl/acre**
S	Silver Sheen	0.04 - 0.30	4 x 10^{-5} – 3 x 10^{-4}	1.6 x 10^{-6} - 1.2 x 10^{-5}	0.04 - 0.30	1 x 10^{-3} - 7.8 x 10^{-3}
R	Rainbow Sheen	0.30 - 5.0	3 x 10^{-4} – 5 x 10^{-3}	1.2 x 10^{-5} - 2.0 x 10^{-4}	0.3 - 5.0	7.8 x 10^{-3} - 1.28 x 10^{-1}
M	Metallic Sheen	5.0 – 50	5 x 10^{-3} – 0.05	2.0 x 10^{-4} - 2.0 x 10^{-3}	5.0 - 50	1.28 x 10^{-1} - 1.28
T	Transitional Dark (or true) Color	[50 – 200]	0.05 – 0.2	2.0 x 10^{-3} - 8 x 10^{-3}	50 - 200	1.28 - 5.1
D	Dark (or true) Color	[>200]	>0.2	>8 x 10^{-3}	>200	>5.1
E	Emulsified	Thickness range is very similar to that of dark oil.				

Chart from Bonn Agreement Oil Appearance Code (BAOAC) May 2, 2006, modified by A. Allen

*Visual appearances and corresponding thicknesses of surface oil vary by oil type and environmental condition. Therefore, generalized thicknesses are used the portrayal of modelling results.

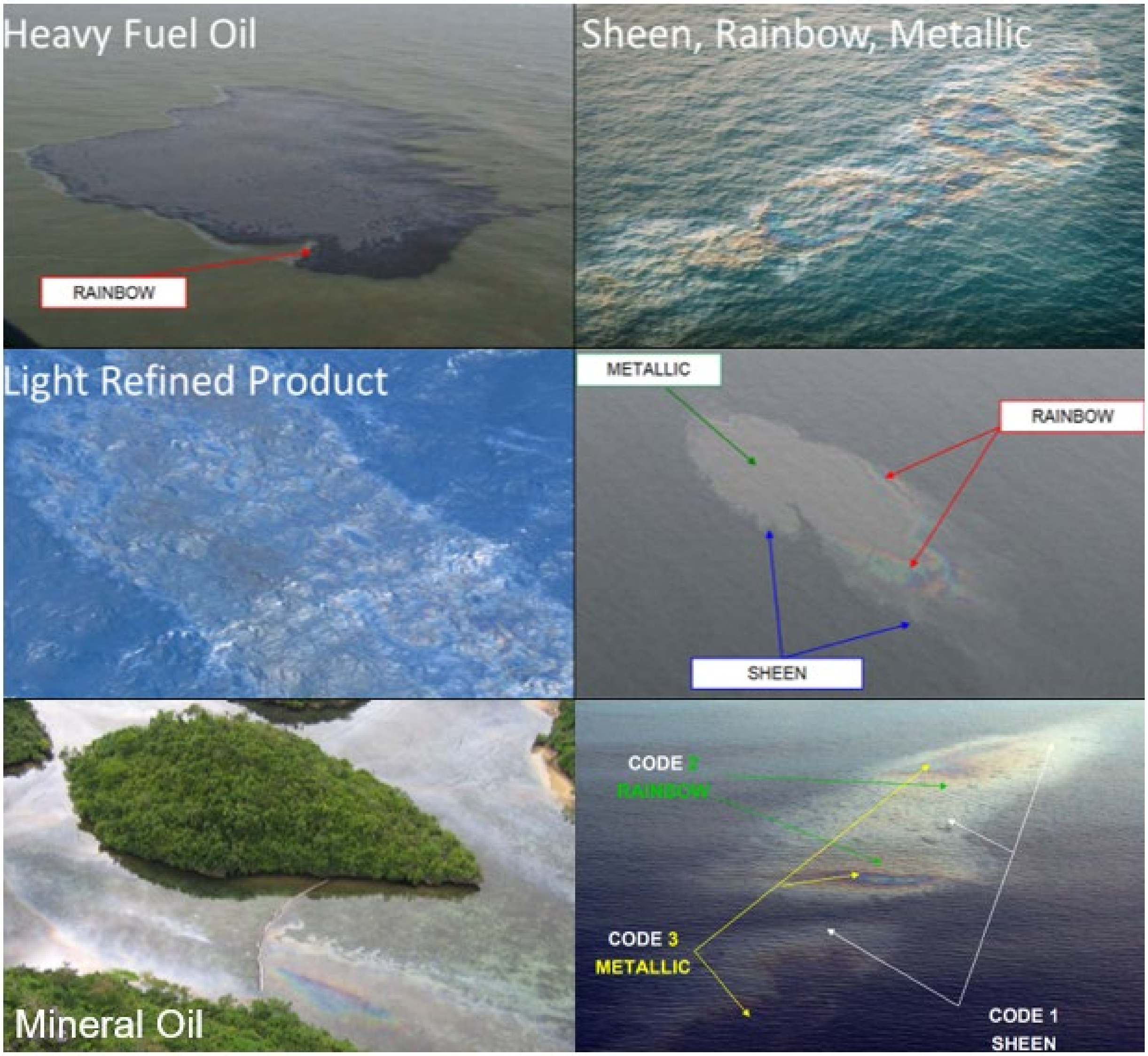


Figure 19. Aerial surveillance images of released oil in the environment as examples of different visual appearances based on surface oil thickness and product type (Bonn Agreement, 2011).

3.3 Oil Spill Scenarios

Vineyard Mid-Atlantic identified two representative ESP locations from the OCS-A 0544 Lease Area that were the shortest distance to the New York (ESP 1) and New Jersey (ESP 2) coastlines, respectively. Release scenarios for the stochastic simulations assumed a spill from an instantaneous, catastrophic loss of the complete contents of the ESP at each representative location (Table 7). Thousands of particles were used in OILMAP/SIMAP to simulate the surface release of oil as a near instantaneous release tracked over the course of 20 days. The stochastic model was run for the two different scenarios using 400 simulations each covering the span of 5 years (2006 to 2010). These results were then reanalyzed over four seasons, each consisting of 100 simulations (Table 8). As described in Section 2, a combination of HYCOM Reanalysis and HYDROMAP modeled tidal circulation was used as current inputs to the model, while CFSR was used as wind inputs.

Table 7. Release locations used in oil spill modeling.

Site	Description	Latitude N (decimal degrees)	Longitude W (decimal degrees)
ESP 1	Shortest distance to New York coastline	40.31967	73.00236
ESP 2	Shortest distance to New Jersey coastline	40.20247	73.20659

Table 8. Oil spill scenarios defined for the oil spill modeling.

ID	Site	Oil Type	Season	Total Volume Released
1	ESP 1	Oil Mixture (Diesel + Naphthenic Oil)	Spring: (March–May)	8,047 bbl (337,969 gal)
2			Summer: (June–August)	
3			Fall: (September-November)	
4			Winter: (December–February)	
5	ESP 2	Oil Mixture (Diesel + Naphthenic Oil)	Spring: (March-May)	8,047 bbl (337,969 gal)
6			Summer: (June–August)	
7			Fall: (September–November)	
8			Winter: (December–February)	

3.4 Oil Characteristics

Two main oil types were chosen as representative oils to be used within the Lease Area after communication between Vineyard Mid-Atlantic and RPS. The two oils in order of prevalence in the final mixture are: (1) Naphthenic oil produced by Nynas known as “Nytro 10X” and (2) diesel fuel, using the properties of “Diesel 2002” as presented on Environment Canada’s oil property database.

Using these components, one theoretical “combination oil” was generated by creating two mass-weighted averages of the two-constituents calculated by utilizing the volumes specified by Vineyard Mid-Atlantic. The naphthenic and diesel represent approximately 92% and 8% of the total mixture, respectively. Thus, the properties of the final combined oil most closely resemble the naphthenic oil which dominates the mixture. The compositional breakdown of scenarios is presented in Table 9 and the bulk properties of all component and mixtures of hydrocarbons are presented in Table 10.

Table 9. Composition of Oil Mixtures for the Modeled scenarios. Properties from Environment Canada oil properties database.[2]

	Bulk Property	Naphthenic Oil (Nytro 10x)	Diesel	Total
Representative ESP location	Volume (L)	1,188,081	92,437	1,279,352
	Volume (bbl)	7,473	581	8,047
	Total mass (kg)	1,031,135	89,664	1,120,799
	Mass fraction	92%	8%	100%

Table 10. Bulk properties for each of the component hydrocarbons and mixtures for the modeled ESPs. Oil properties are from Environment Canada oil properties database.

	Component Hydrocarbons	
Bulk Property	Naphthenic (Nytro 10x)	Diesel
Density at 25°C (g/cm^3)	0.8679	0.970
Viscosity at 15°C centipoise (cP)	26.0	2.8
% mass with boiling point 0-180°C	0.0%	16.4%
% mass with boiling point 180-165°C	17.1%	49.0%
% mass with boiling point 265-380°C	66.4%	31.9%
% mass with boiling point >380°C	16.5%	2.7%
Surface Tension in millinewtons per meter (mN/m)	45	28

[2] Note that the oil mixture volume (i.e., 8,047 bbls) was used to calculate the total mass of the oil mixture (i.e., 1,120,799 kg). This mass, when separated into its component oils, was then converted into volumes using the oil densities provided in Table 11. Due to rounding errors, the sum of the component volumes has a >0.1% error compared to actual total volume. The following underlying equation is provided to further illustrate this point: 7,473 bbl of Nytro 10x + 581 bbl of diesel = 8,054 bbl of oil mixture. This value varies from the actual total mixture volume of 8,047 bbl by >0.1%.

4 STOCHASTIC MODELING RESULTS

OILMAP/SIMAP's stochastic model computed the probable surface and shoreline trajectories of surface releases of oil mixtures from two representative ESP locations for four seasons. Over 100 simulations define each seasonal spill scenario. Stochastic trajectory results were summed to calculate probabilities of surface oiling and minimum travel time for each spill scenario including oil contamination of the water surface and shoreline.

The stochastic results for all spill scenarios are summarized in Table 11. The average time to reach the shoreline and the average mass of oil washed ashore were calculated based on all the individual trajectories that led to oil reaching shore with more than 0.1% of the initial spilled volume. The percentage of simulations reaching shore was based on the number of trajectories out of the total number of individual simulations run for the stochastic modeling in which at least 0.1% of the spilled volume was predicted to reach shore. Thickness thresholds for shoreline contamination were not used in the below calculations, and as such results present conservative probabilities and timing. It is also important to note that the time to reach shore is based on the minimum time for any shoreline contamination to occur and does not indicate the thickness of shoreline contamination occurring at that time.

Table 11. Oil spill stochastic results—predicted shoreline impacts for each scenario.

ID	Spill Site	Oil Type	Season	Total Volume Released	Sims. Reaching Shore (%) [1]	Time to Reach Shore (hours)		Contamination to shoreline (% of total release)	
						Min.	Avg.	Max.	Avg.
1	ESP 1	Oil Mixture	Spring: (Mar.-May)	8,047 bbl (337,969 gal)	60.0%	34.3	190.9	11.3%	2.9%
2			Summer: (June-Aug.)		60.0%	41.5	158.8	16.0%	4.8%
3			Fall: (Sept.-Nov.)		56.0%	29.0	192.1	13.2%	3.6%
4			Winter: (Dec.-Feb.)		5.0%	71.3	124.3	2.3%	0.6%
5	ESP 2	Oil Mixture	Spring: (Mar.-May)	8,047 bbl (337,969 gal)	59.0%	39.3	217.1	11.0%	2.5%
6			Summer: (June-Aug.)		64.0%	63.0	181.2	15.1%	4.2%
7			Fall: (Sept.-Nov.)		51.0%	40.0	192.9	13.7%	3.6%
8			Winter: (Dec.-Feb.)		4.0%	128.8	155.8	2.6%	0.7%

Notes:

1. The percentage of simulations reaching shore is based on the number of trajectories out of the ensemble of stochastic individual simulations with >0.1% of the total mass reaching shore. Since these calculations are based on total mass reaching shore, thickness thresholds were not incorporated.

Results from the stochastic modeling are provided in maps depicting the probability and timing of oil contamination on the surface and shoreline in excess of the threshold oil thicknesses (0.01 mm [0.0004 in] and 0.05 mm [0.002 in] for surface oil; and 0.1 mm [0.004 in] for shoreline oil) described in Section 3.2. Figure 21 to Figure 28 and Figure 33 to Figure 40 present surface oiling for the ESP 1 and ESP 2 scenarios, respectively. Figure 29 to Figure 32 and Figure 41 to Figure 44 present shoreline oiling for the ESP 1 and ESP 2 scenarios, respectively. Each figure contains two maps, portraying the following information:

1. **Probability of Oil Contact Figures**: The probability of oiling maps for each scenario define the area and the associated probability in which sea surface and shoreline oiling above the defined thresholds (Table 5.) would be expected should a worst case oil release scenario occur. The colored area in the stochastic maps indicates areas that *may* receive oil contamination in the event of that particular spill scenario. The 'hotter' the color (e.g., reds), the more likely an area would be affected; the cooler the colors (e.g., greens), the less likely an area would be affected. The probability of oil contamination was based on a statistical analysis of the resulting ensemble of individual trajectories for each spill scenario. These figures do not imply that the entire contoured area would be covered with oil in the event of a spill, nor do they provide any information on the quantity of oil that would be found in a given area.

2. **Minimum Travel Time Figures**: The footprint of the minimum travel time corresponds to the oil contamination probability maps for oil above the threshold of concern. These figures illustrate the shortest time required for oil to reach any point within the footprint at a thickness or concentration

exceeding the defined threshold for surface and shoreline oil contamination. These results are based on the ensemble of all individual trajectories.

It is important to note that the probability of a spill trajectory passing through a certain water surface area and the probability of a spill trajectory hitting a shoreline segment near that water surface area are different. For example, in the schematic shown in Figure 20, there are four trajectories total, which do not overlap near the shore. Thus, the surface oiling probability at a surface water grid cell near the shore (yellow cell) is 25%, since only one out of four trajectories crosses that grid cell. However, the probability of shoreline oiling within the green bracketed segment near the yellow surface water cell is 75%, since three out of four trajectories intercept that particular shoreline segment. In the locations in which two of the four trajectories do overlap within a surface water grid cell, the probability of oiling is 50% (purple cell). In addition, oil contamination to the shoreline has a cumulative effect over an individual run, since oil that hits the shoreline is stranded there, and more oil can accumulate. In contrast, oil contamination on the surface only shows the maximum concentration at each grid cell for any given time (i.e., oil can move through a cell in cumulative excess of the threshold but still not exceed the threshold at any given time).

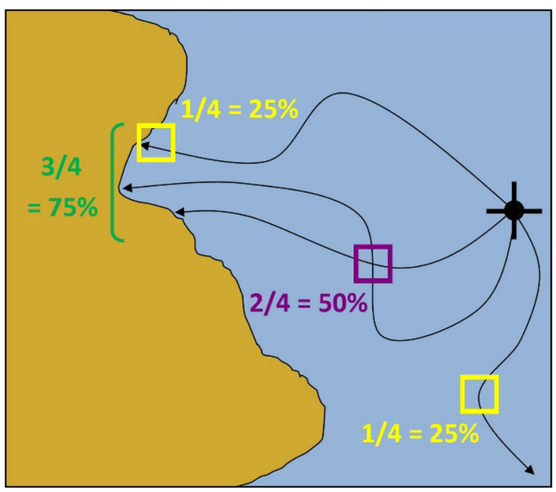


Figure 20. Example illustration of the difference between surface and shoreline oiling probabilities. Surface probabilities in yellow and purple, shoreline probabilities in green.

4.1 ESP 1 Stochastic Results

4.1.1 Oil Contamination to Water Surface

Figure 21 to Figure 28 provide the results of surface oil contamination for the spill scenarios over each season. In all four seasons, the sea surface area exposed to oil exceeding the 0.01 mm (10 µm ≈ 10 g/m^2 on average over the grid cell; 0.0004 in) threshold is contained within a radius up to approximately 200 km (124 mi) of the spill location, with the largest stochastic contour comprised of a 1–10% probability. In all four seasons, the sea surface area exposed to oil exceeding the 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell; 0.002 in) threshold is contained within a radius up to 75 km (47 mi) of the spill location, with the largest stochastic contour comprised of a 1–10% probability.

Three of the seasons (spring, summer and fall; Figure 21 to Figure 26, respectively) demonstrate similar water surface oil exposure footprints, while the winter scenarios (Figure 27 and Figure 28) depict relatively smaller footprints which are more centralized around the spill site. With respect to results associated with the 0.01 mm (0.0004 in) threshold, the surface oiling probability footprint extended furthest to the southwest in the spring season and to the northeast in the summer season. With respect to results associated with the 0.05 mm (0.002 in) threshold, the surface oiling probability footprint extended furthest to the north in the spring scenario, to the northeast in the summer and fall scenarios, and slightly to the south in the winter scenario.

It is important to note again that these scenarios are very conservative and do not include the use of oil spill response equipment, which Vineyard Mid-Atlantic would implement in the case of a spill. Moreover, results associated with a threshold of 0.05 mm (0.002 in) indicate oil that is anticipated to be recoverable; therefore, if recovered within the timeframes specified, the overall surface oiling footprint would likely be smaller than currently indicated.

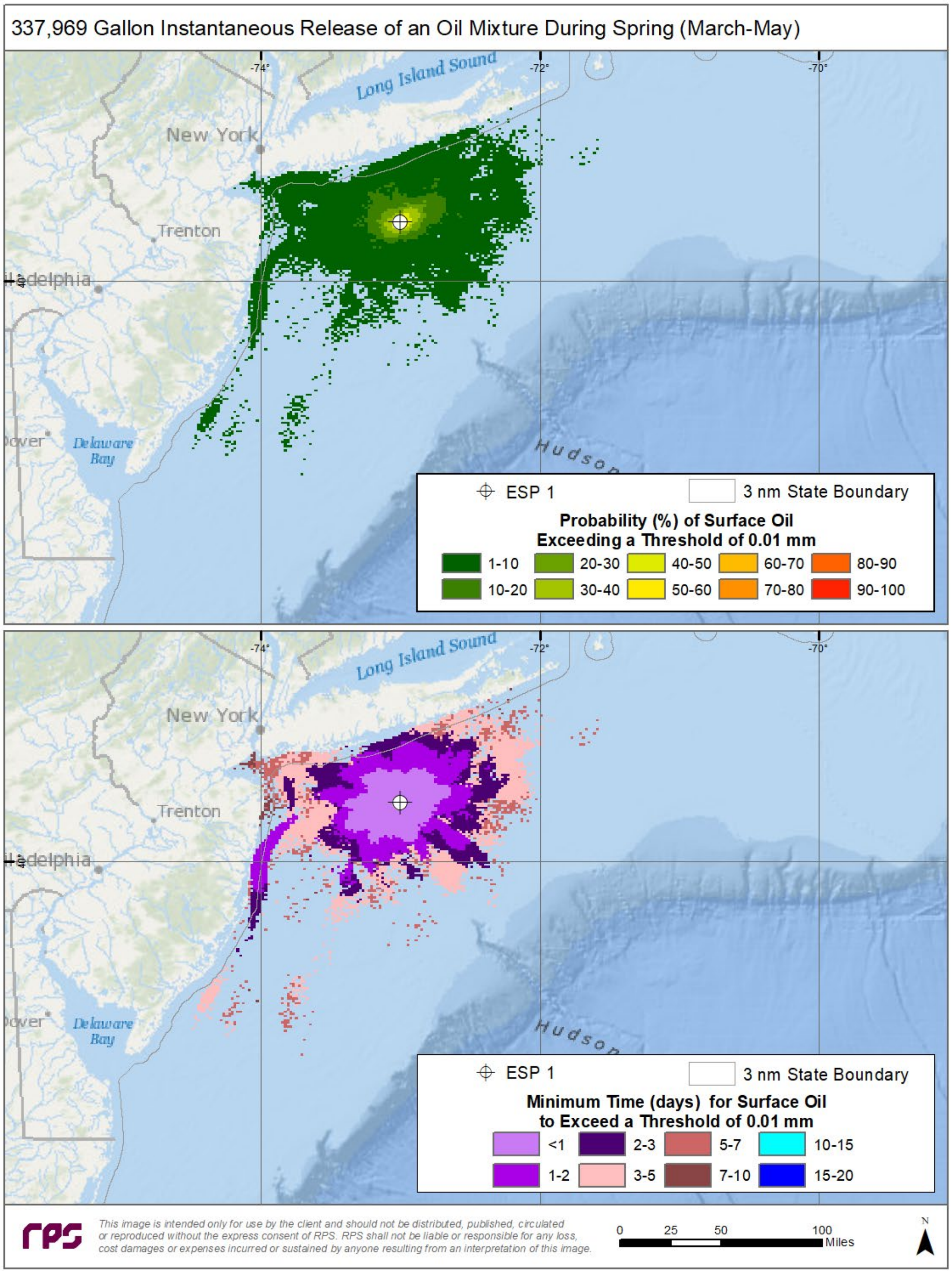


Figure 21. Top Panel—Probability of surface oiling above a minimum thickness of 0.01 mm (10 µm ≈ 10 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.01 mm.

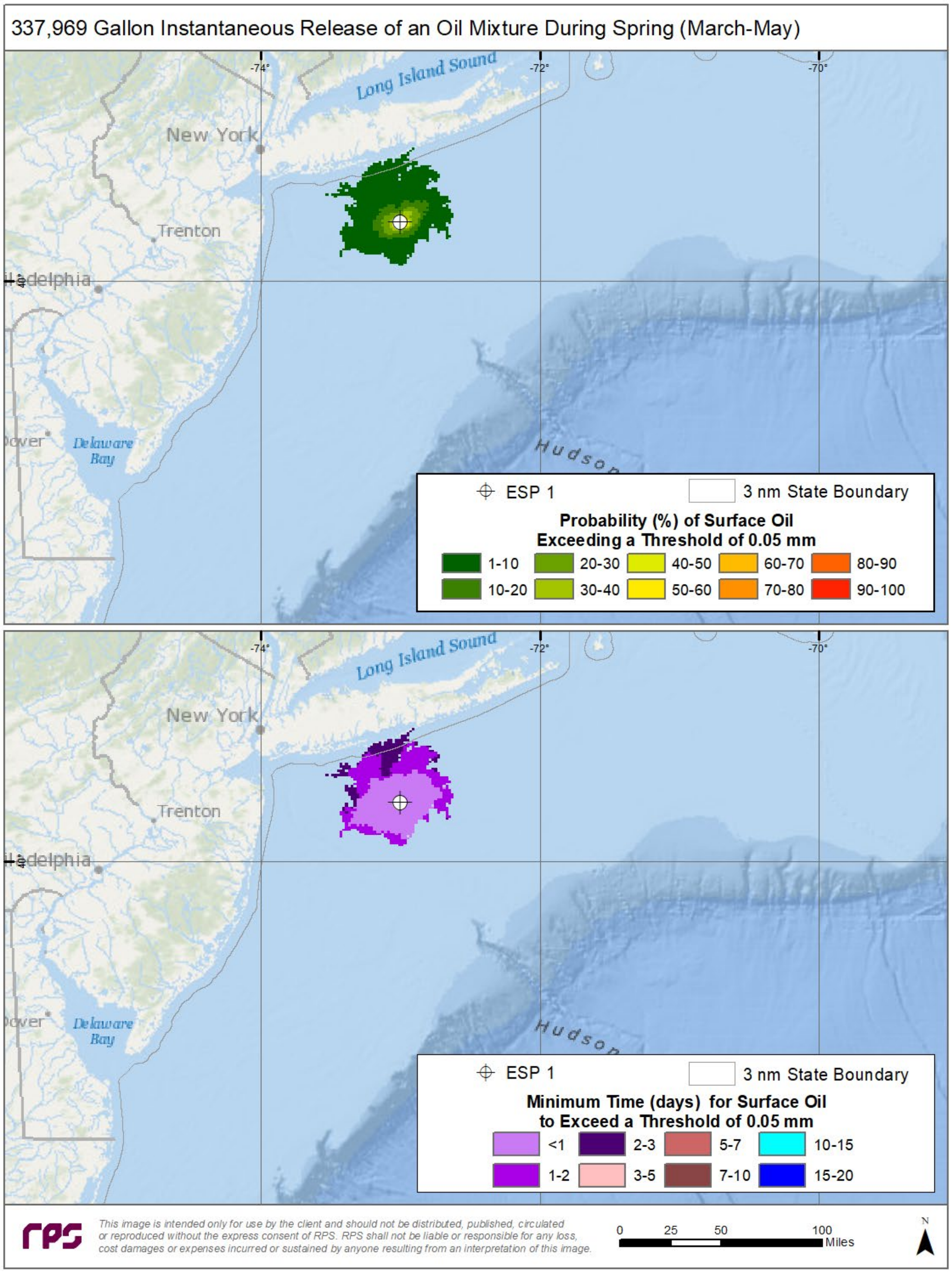


Figure 22. Top Panel—Probability of surface oiling above a minimum thickness of 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.05 mm.

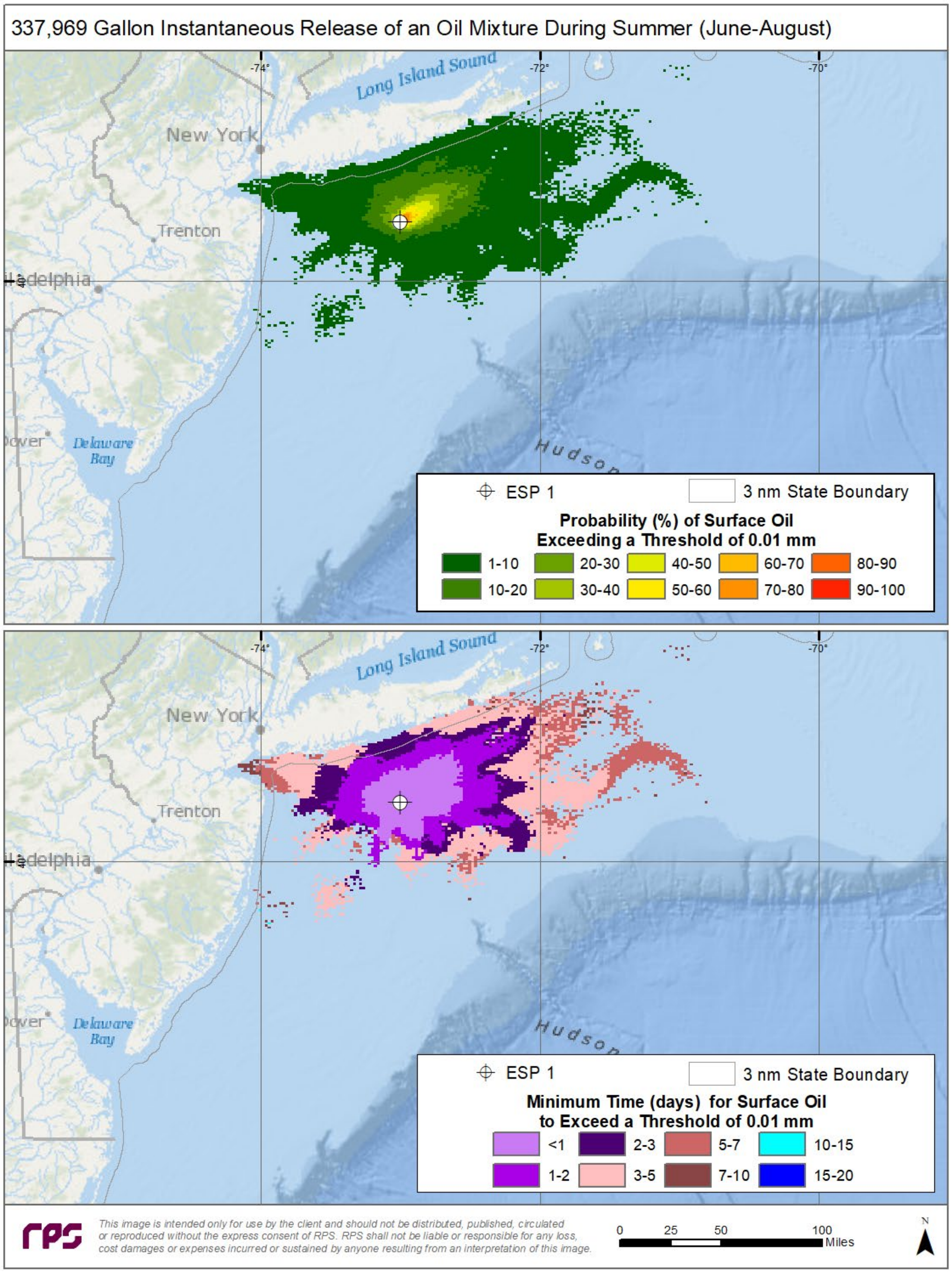


Figure 23. Top Panel–Probability of surface oiling above a minimum thickness of 0.01 mm (10 µm ≈ 10 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.01 mm.

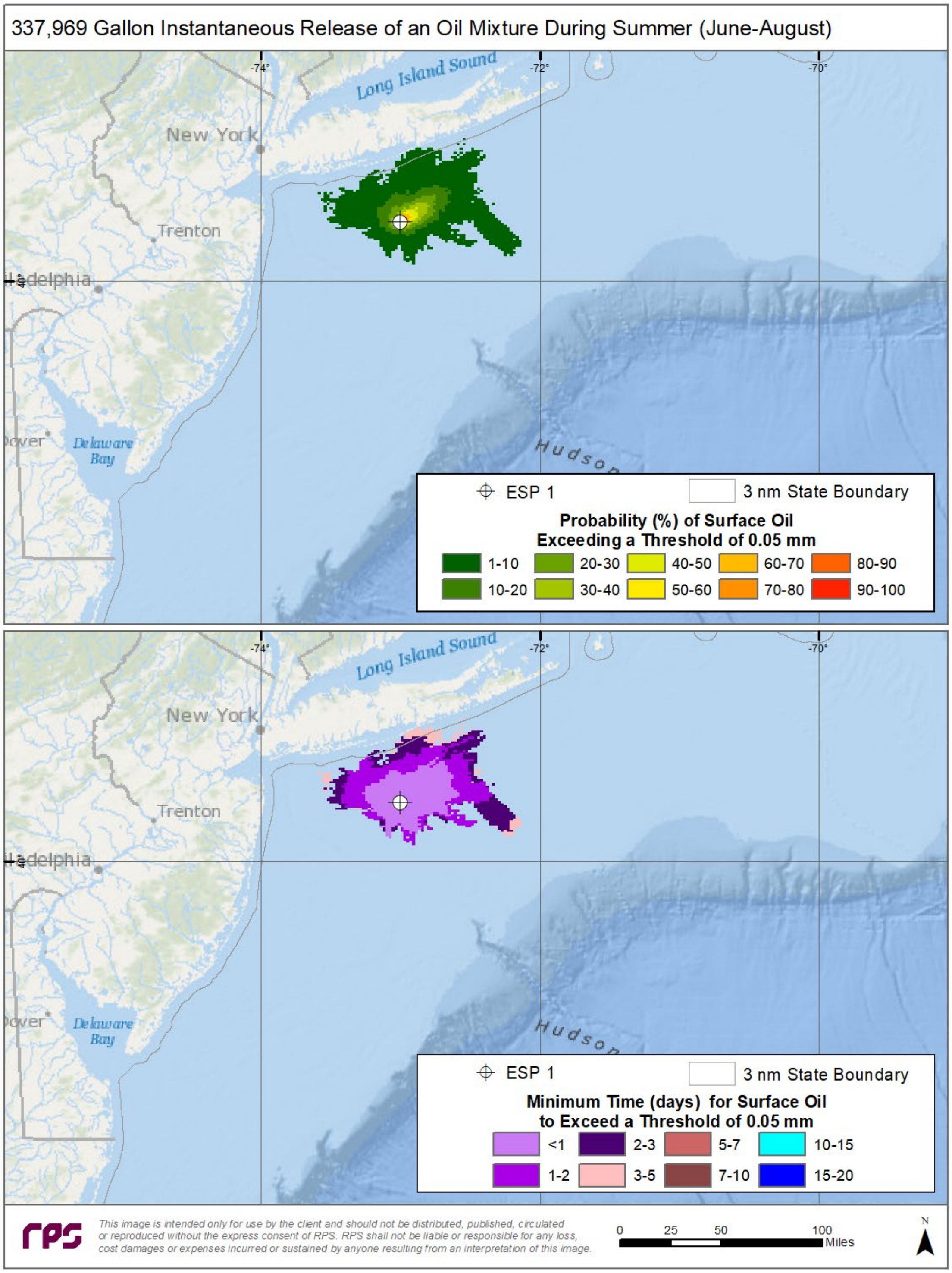


Figure 24. Top Panel–Probability of surface oiling above a minimum thickness of 0.05 mm (50 µm≈ 50 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.05 mm.

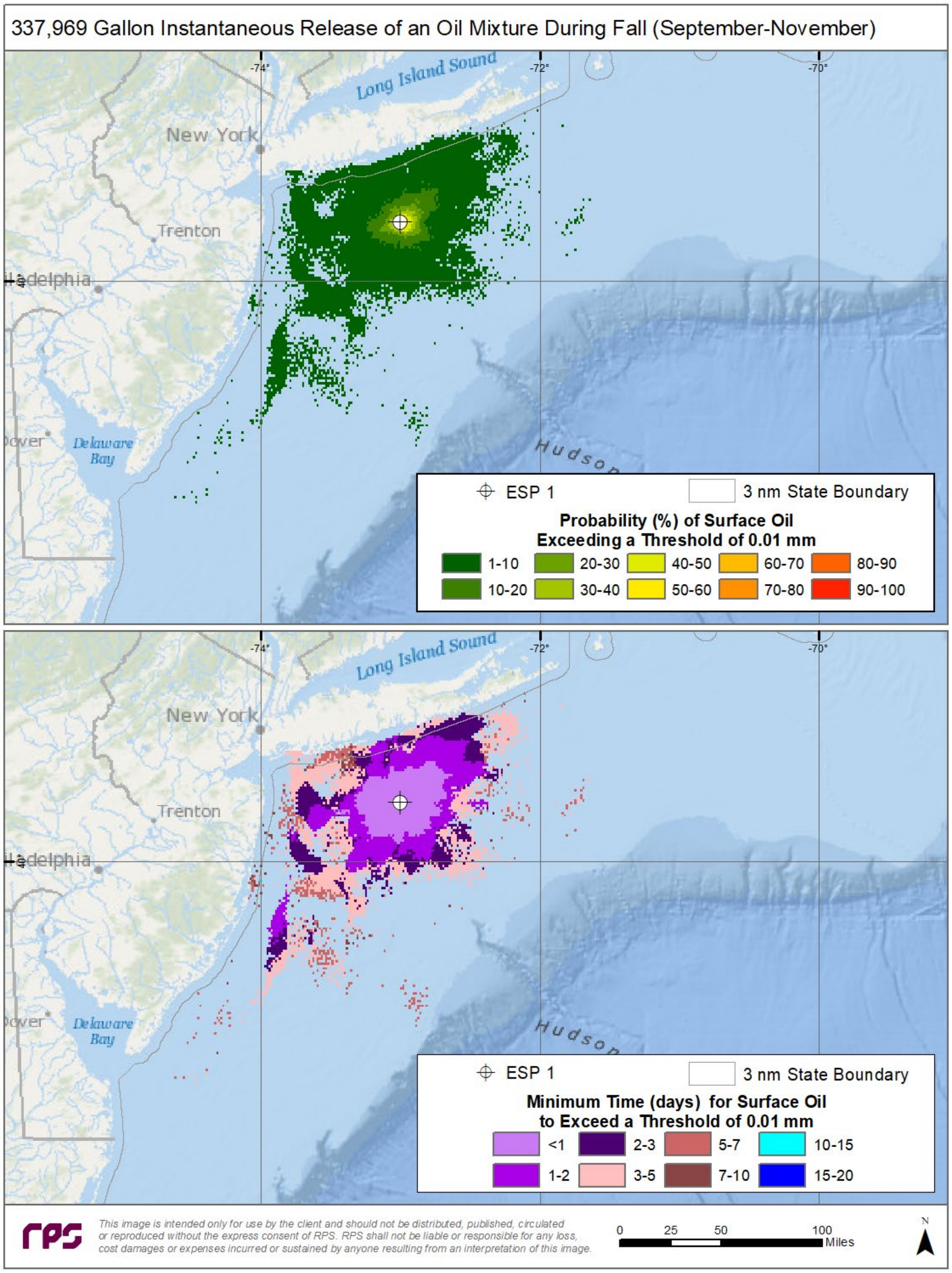


Figure 25. Top Panel—Probability of surface oiling above a minimum thickness of 0.01 mm (10 µm ≈ 10 g/m² on average over the grid cell) during fall months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.01 mm.

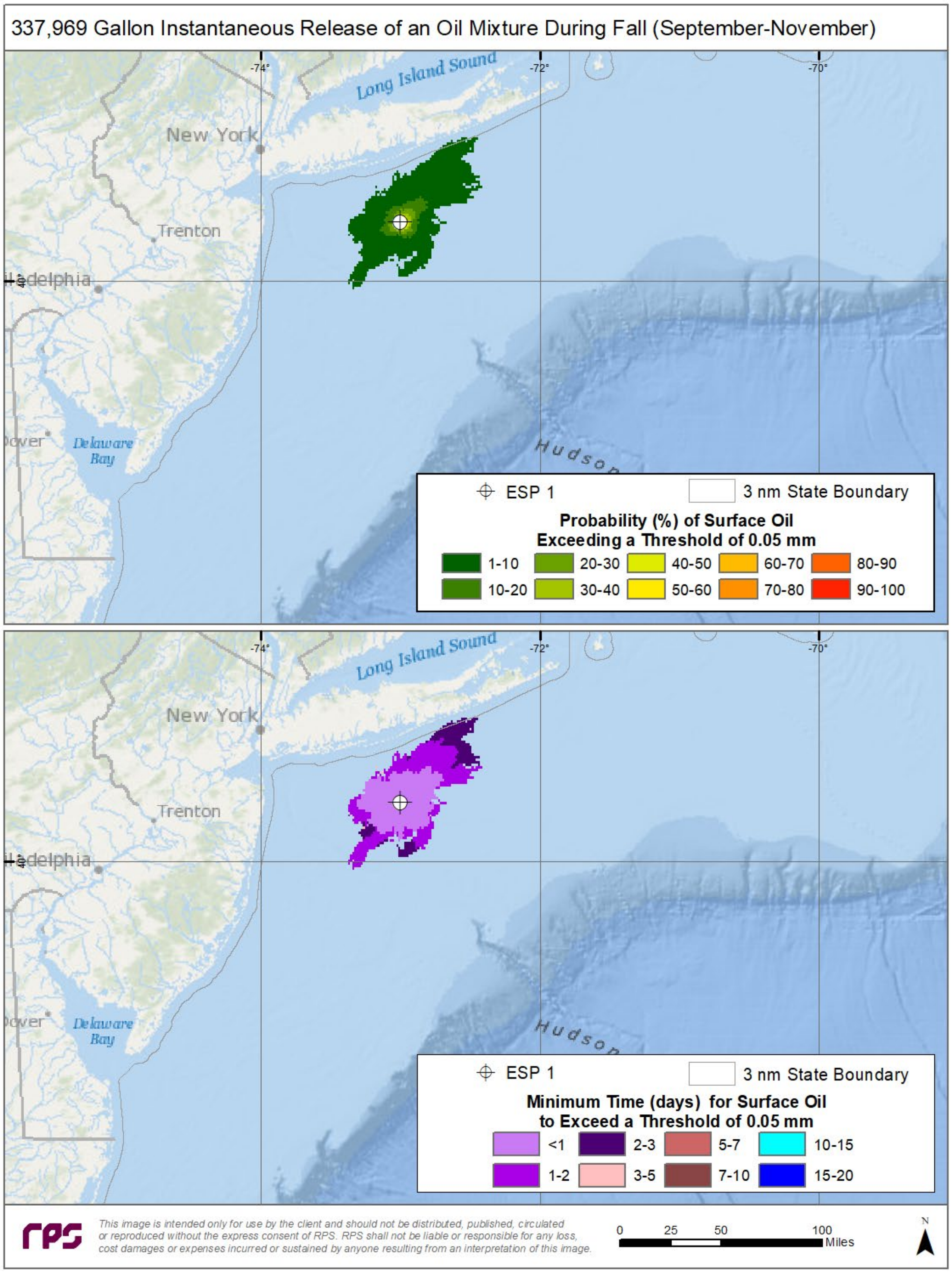


Figure 26. Top Panel—Probability of surface oiling above a minimum thickness of 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.05 mm.

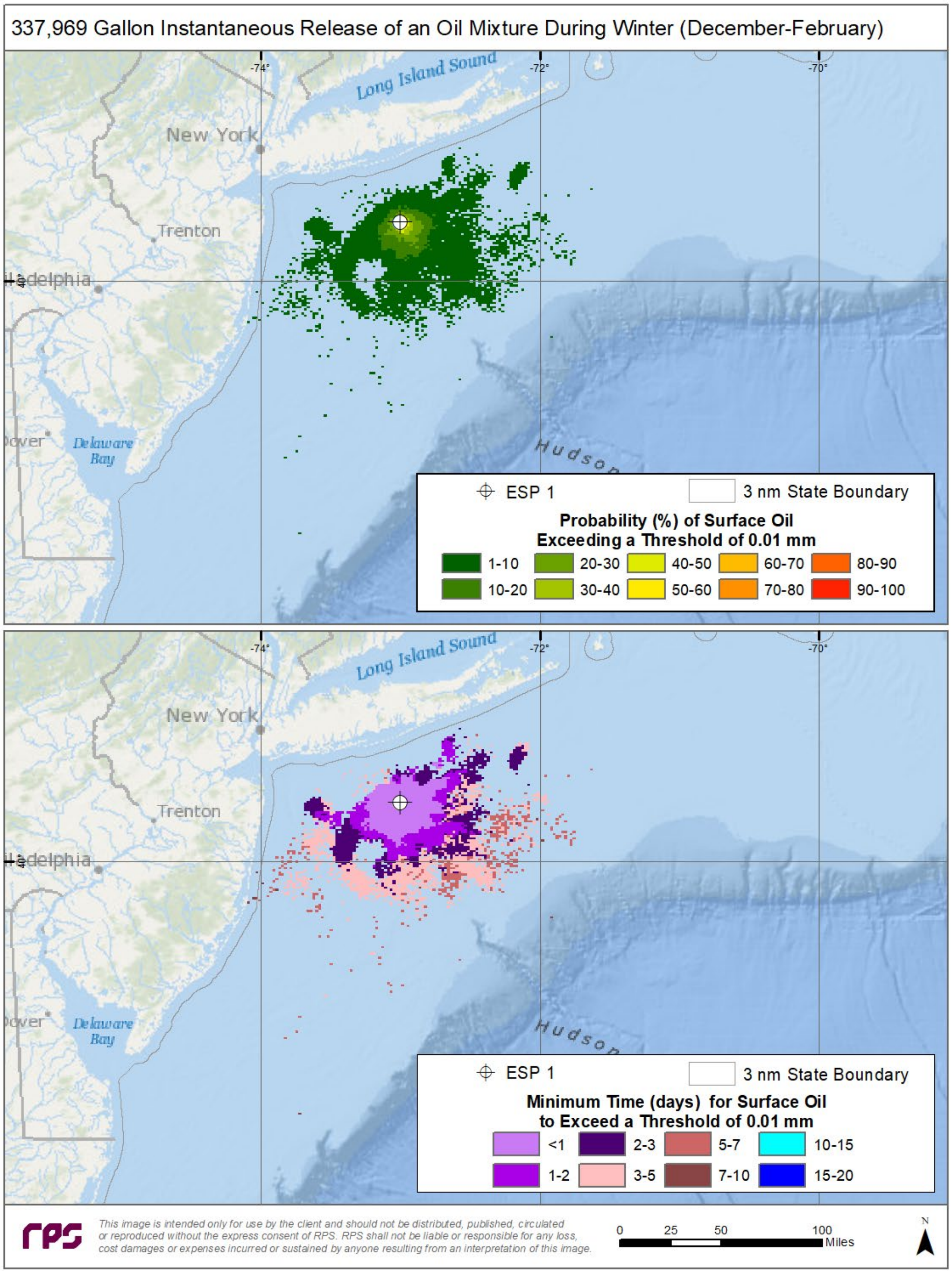


Figure 27. Top Panel—Probability of surface oiling above a minimum thickness of 0.01 mm (10 µm ≈ 10 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.01 mm.

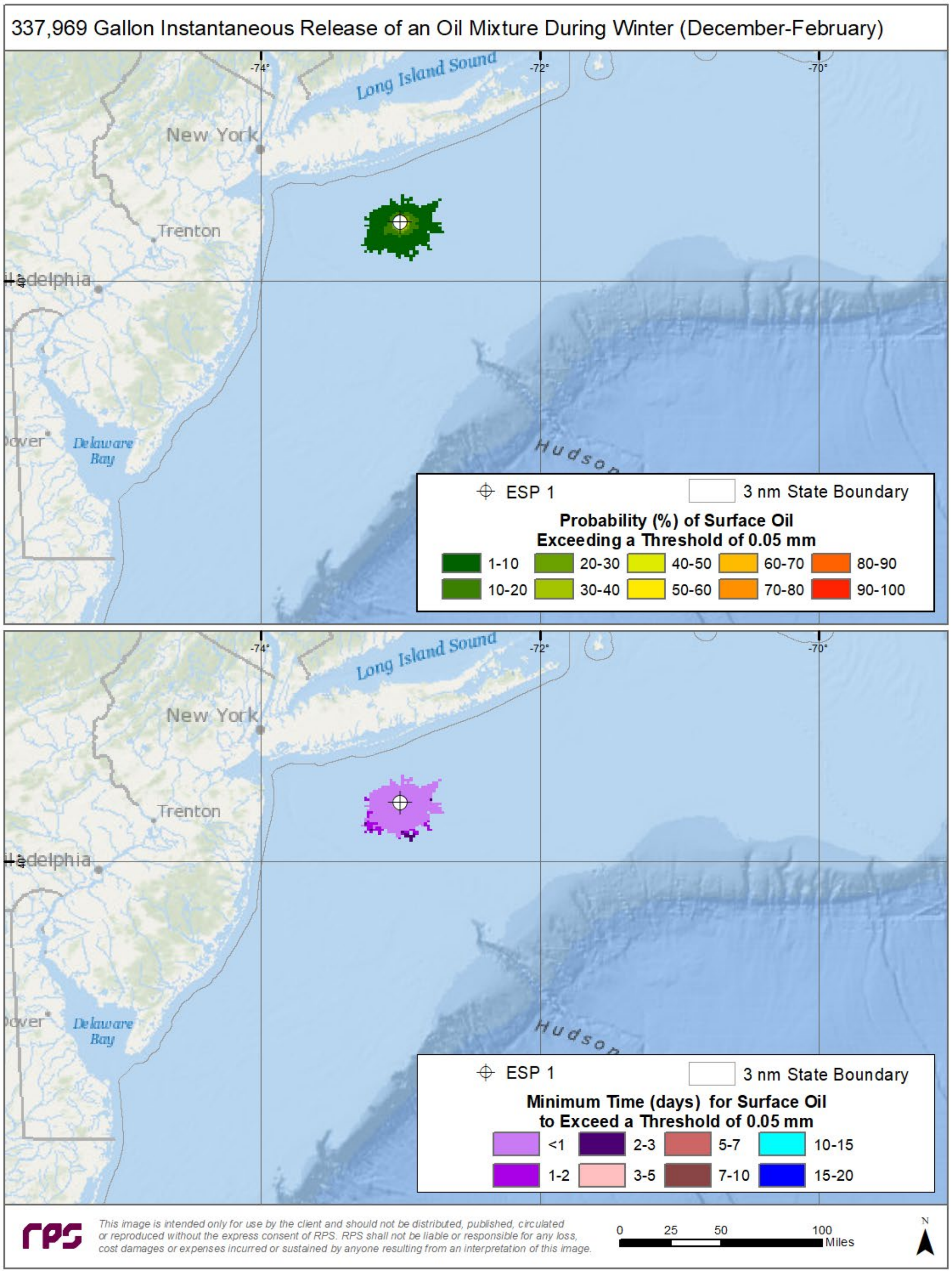


Figure 28. Top Panel—Probability of surface oiling above a minimum thickness of 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.05 mm.

4.1.2 Oil Contamination to Shore

The following figures illustrate the results of oil contamination to the shoreline for the spill scenarios over each season at the ESP 1 spill location. Figure 29 to Figure 32 indicate that, in all seasons, there is ≤10% probability that oil above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell; 0.004 in) released from the ESP 1 location would reach the shorelines of Long Island, New York and mid-to-south New Jersey within 20 days of the release. In the winter scenario, the predicted areas of shoreline probability >1% with oil contamination above a minimum thickness of 0.1 mm (0.004 in) were contained to the New Jersey coast and were predicted to hit the shoreline within seven to 10 days of the release.

The summer and fall scenarios are expected to have the largest spatial extent of shoreline oiling due to the prevailing winds and currents during these seasons. It is important to note again that these scenarios are very conservative and do not include the use of oil spill response equipment, which Vineyard Mid-Atlantic would implement in the case of a spill. In reality, oil reaching the shores of New Jersey within the time-period of 10-13 days and beyond would be highly unlikely, due to the oil response activities which would be enacted to prevent this shore oiling from occurring.

As described above and shown in Figure 20, the differences in the footprint for the surface and shoreline oil contamination are a result of the surface oil less than 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell; 0.004 in) traveling farther distances and beginning to pile up on shore. It is important to note that oil contamination to the shoreline has a cumulative effect over an individual run, since oil that hits the shoreline is stranded there, and more oil can accumulate.

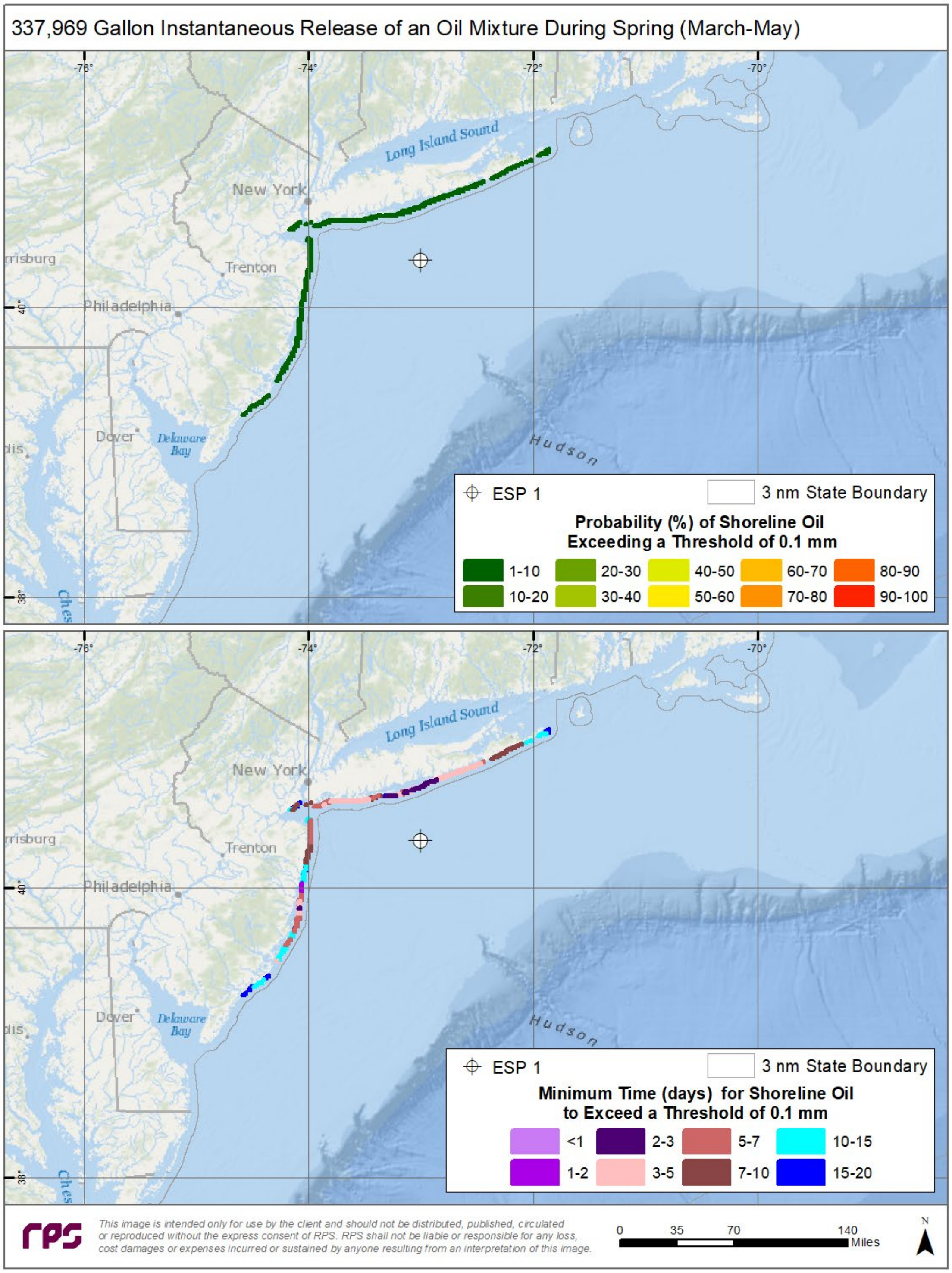


Figure 29. Top Panel—Probability of shoreline oiling above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 0.01 mm.

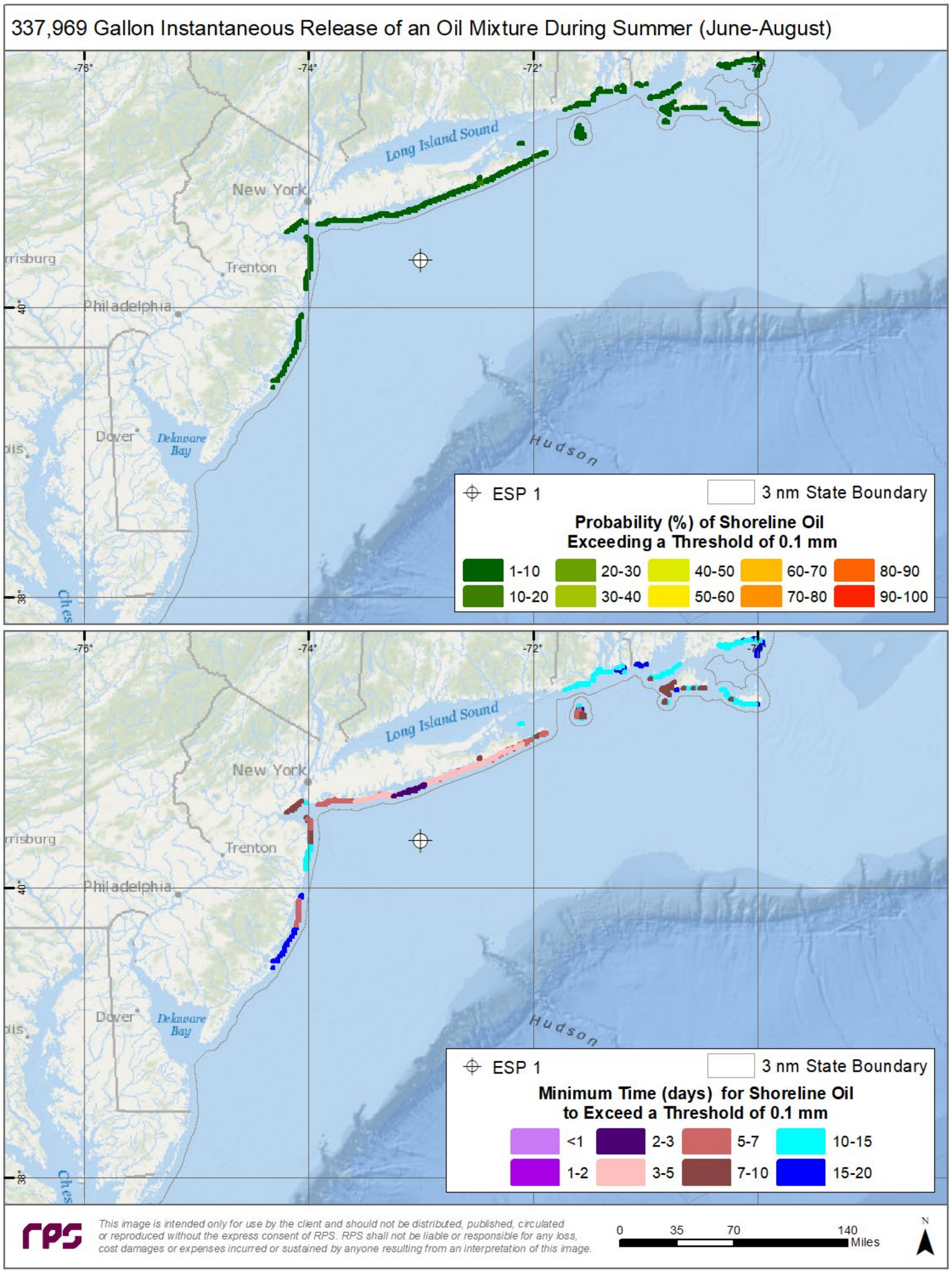


Figure 30. Top Panel—Probability of shoreline oiling above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m² on average over the grid cell) during summer months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 0.1 mm.

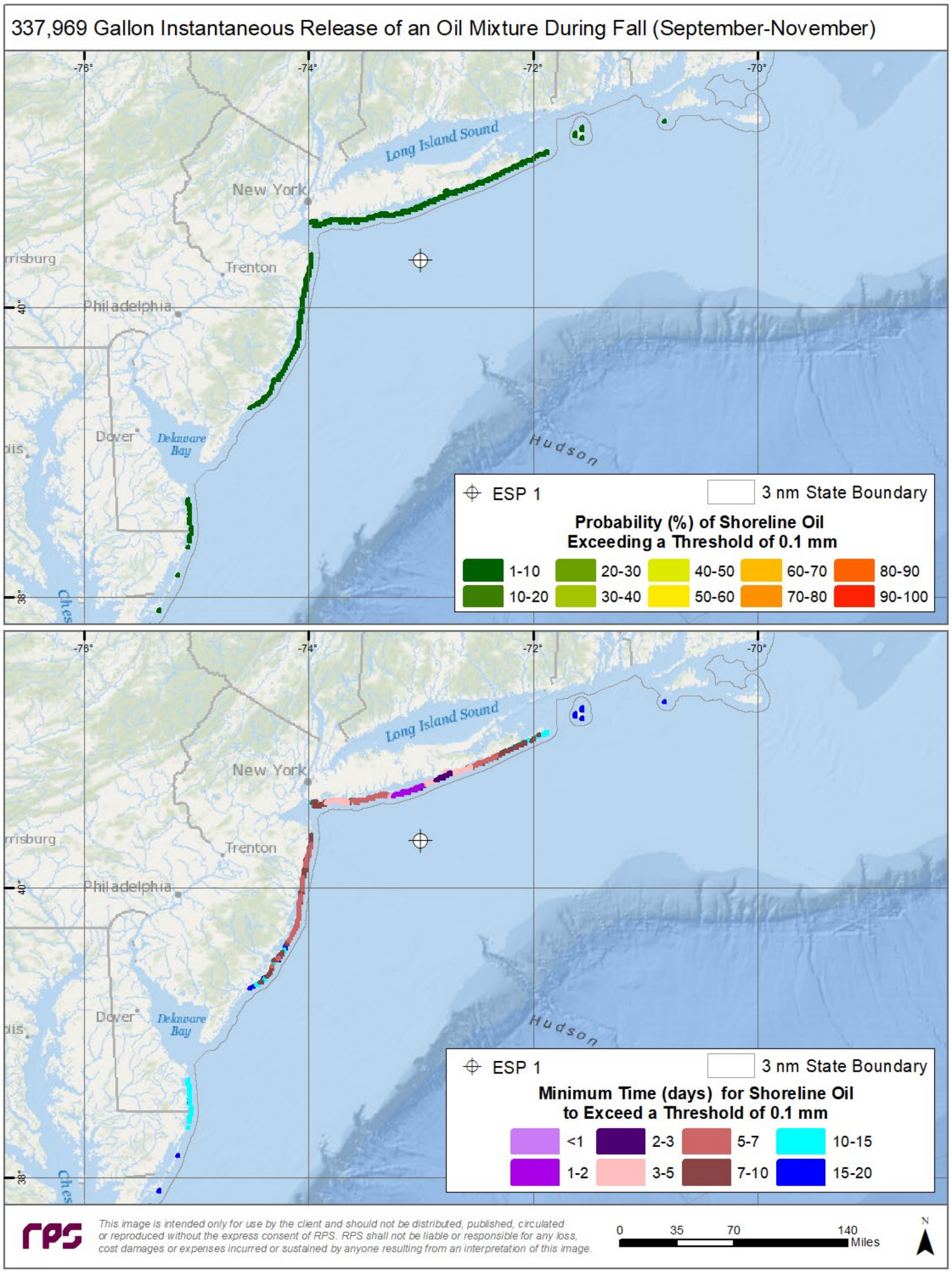


Figure 31. Top Panel—Probability of shoreline oiling above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 0.1 mm.

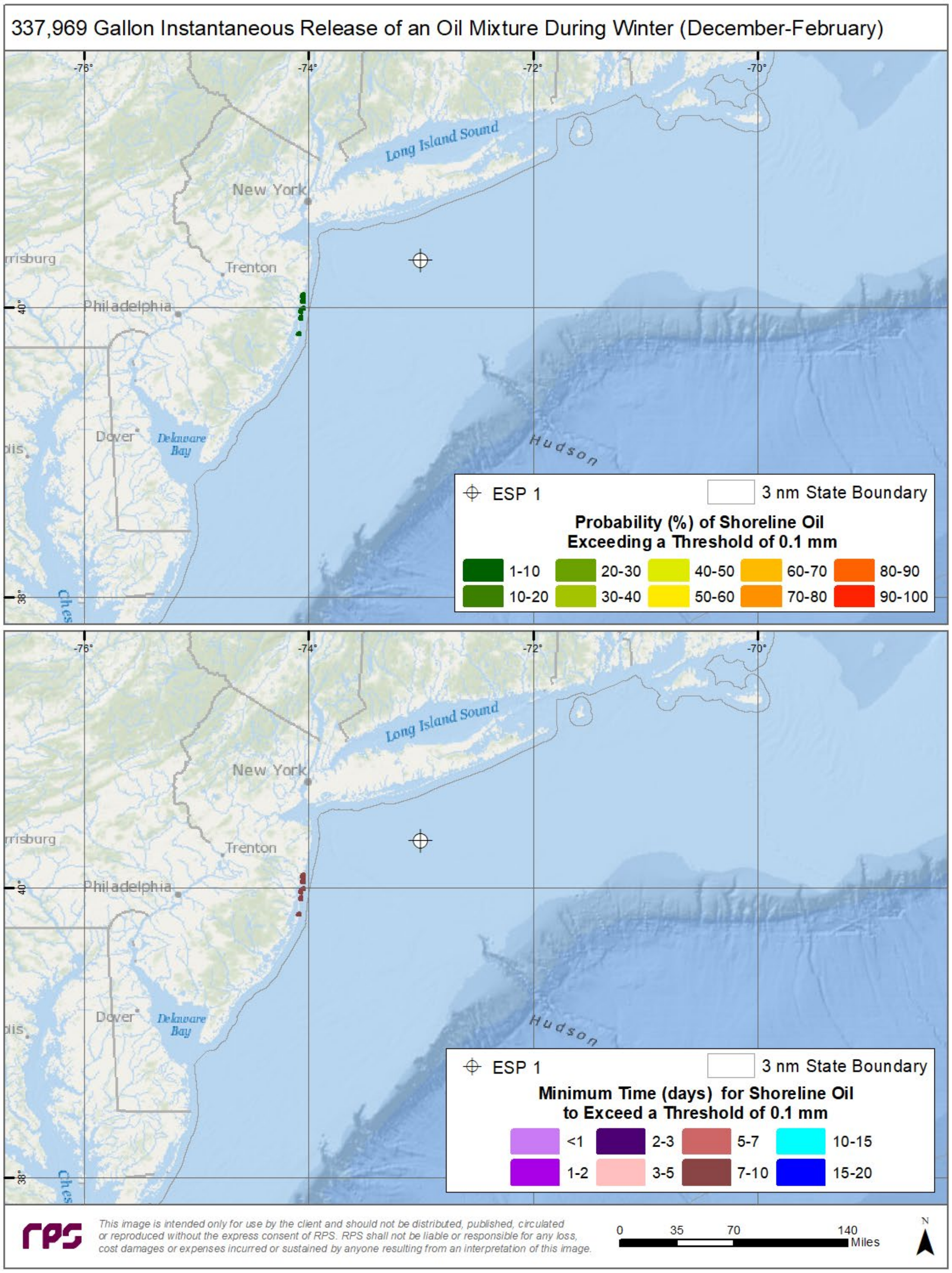


Figure 32. Top Panel—Probability of shoreline oiling above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the ESP 1 location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 0.1 mm.

4.2 ESP 2 Stochastic Results

4.2.1 Oil Contamination to Water Surface

Figure 33 to Figure 40 provide the results of surface oil contamination for the spill scenarios over each season. In all four seasons, the sea surface area exposed to oil exceeding the 0.01 mm (10 µm ≈ 10 g/m^2 on average over the grid cell; 0.0004 in) threshold is primarily contained within a radius up to approximately 180 km (112 mi) of the ESP 2 location, with the largest stochastic contour comprised of 1–10% probability. In all four seasons, the sea surface area exposed to oil exceeding the 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell; 0.002 in) threshold is contained within a radius up to 60 km (37 mi) of the spill location, with the largest stochastic contour comprised of a 1–10% probability.

Three of the seasons (spring, summer and fall; Figure 33 to Figure 38, respectively) demonstrate similar water surface oil exposure footprints, while the winter scenarios (Figure 39 and Figure 40) depict relatively smaller footprints which are more centralized around the spill site. With respect to results associated with the 0.01 mm (0.0004 in) threshold, the surface oiling probability footprint extended furthest to the southwest in the spring scenario and to the northeast in the summer scenario. In all seasons, surface oil was predicted to occur within a minimum of 10 days of the release. With respect to results associated with the 0.05 mm (0.002 in) threshold, the surface oiling probability footprint extended furthest to the north in the spring scenario, to the northeast in the summer and fall scenarios and to the southeast in the winter scenario.

It is important to note again that these scenarios are very conservative and do not include the use of oil spill response equipment, which Vineyard Mid-Atlantic would implement in the case of a spill. Moreover, results associated with a threshold of 0.05 mm (0.002 in) indicate oil that is anticipated to be recoverable; therefore, if recovered within the timeframes specified, the overall surface oiling footprint would likely be smaller than currently indicated.

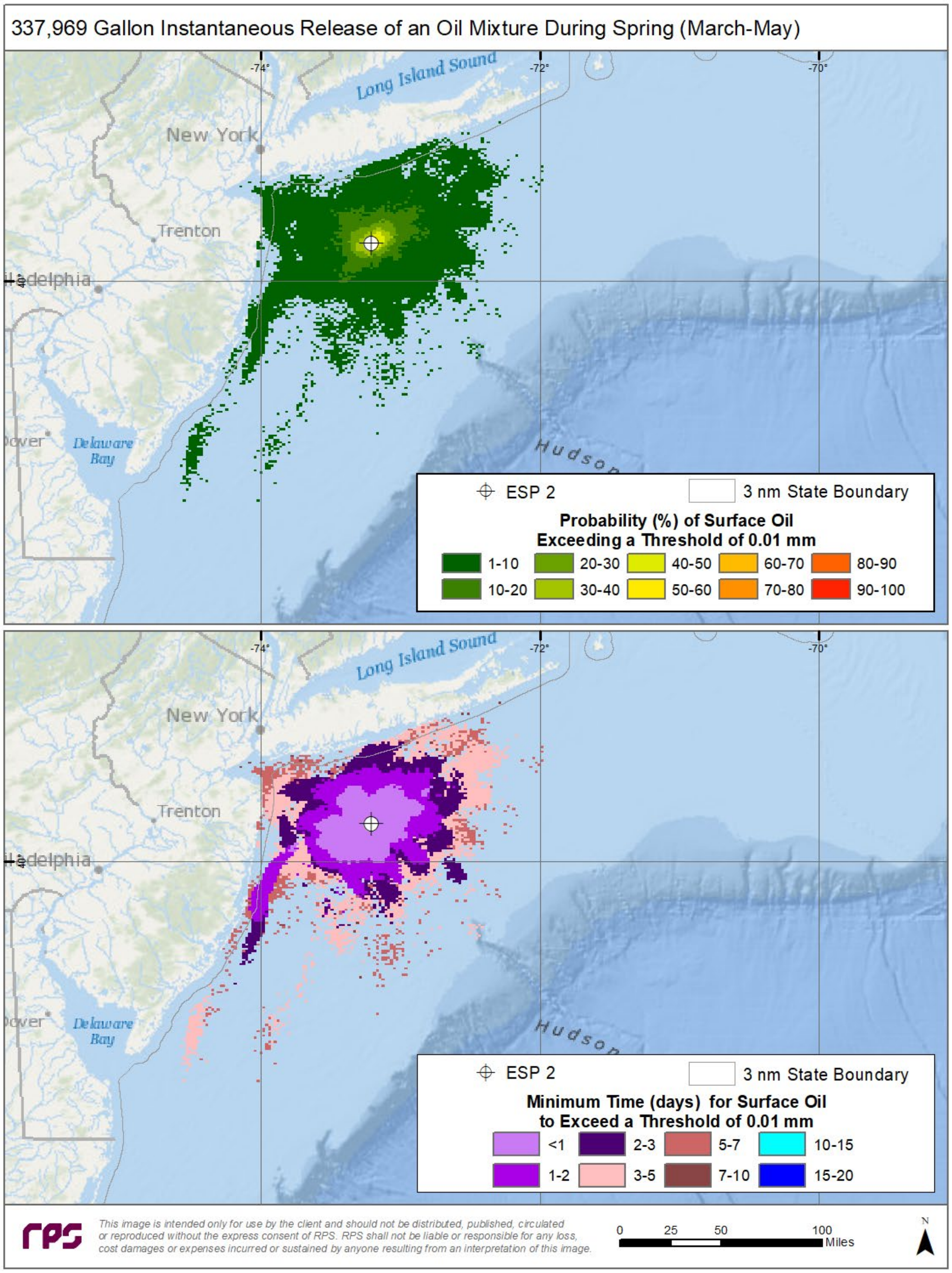


Figure 33. Top Panel—Probability of surface oiling above a minimum thickness of 0.01 mm (10 µm ≈ 10 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.01 mm.

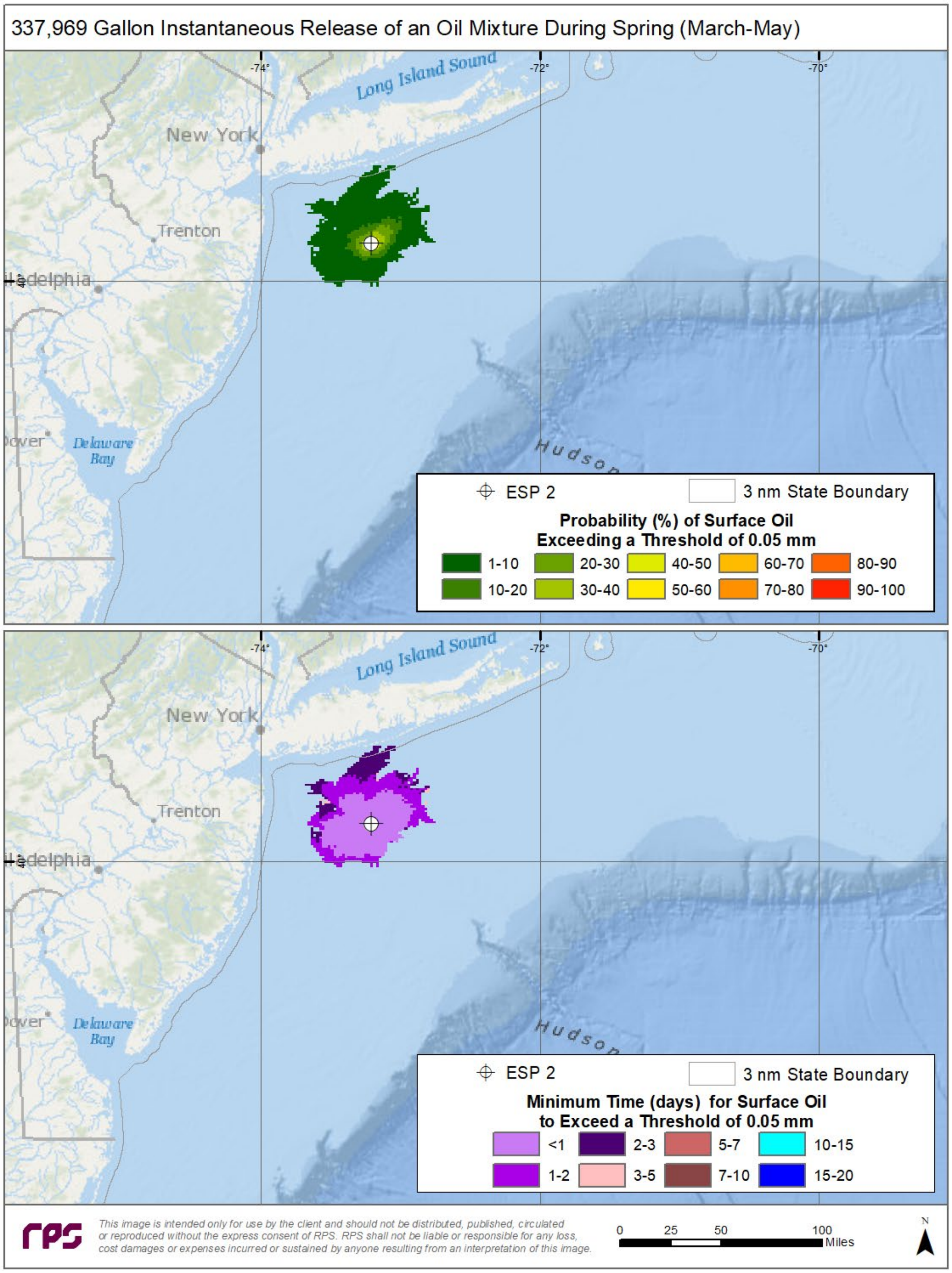


Figure 34. Top Panel—Probability of surface oiling above a minimum thickness of 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.05 mm.

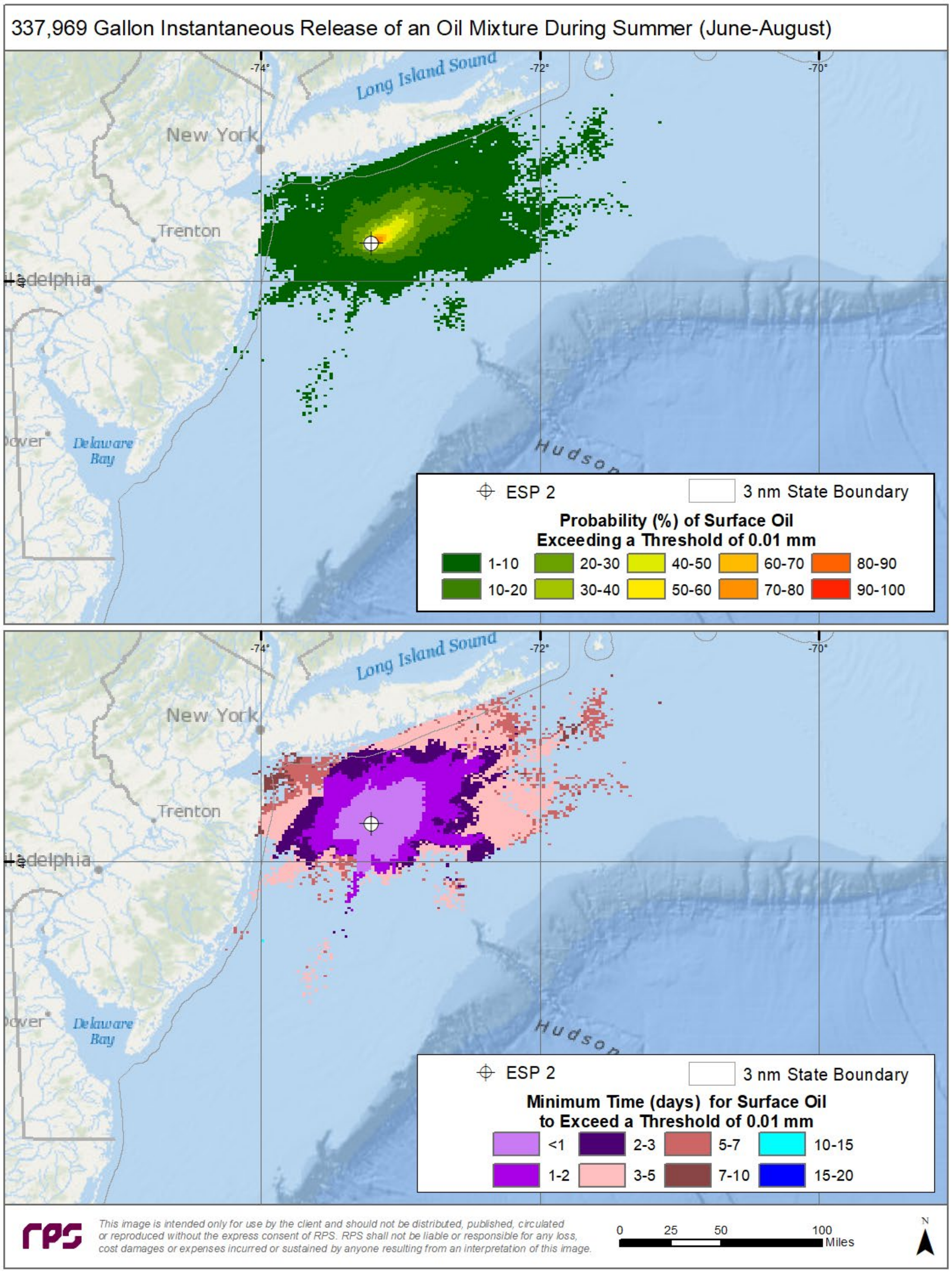


Figure 35. Top Panel–Probability of surface oiling above a minimum thickness of 0.01 mm (10 μm ≈ 10 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.01 mm.

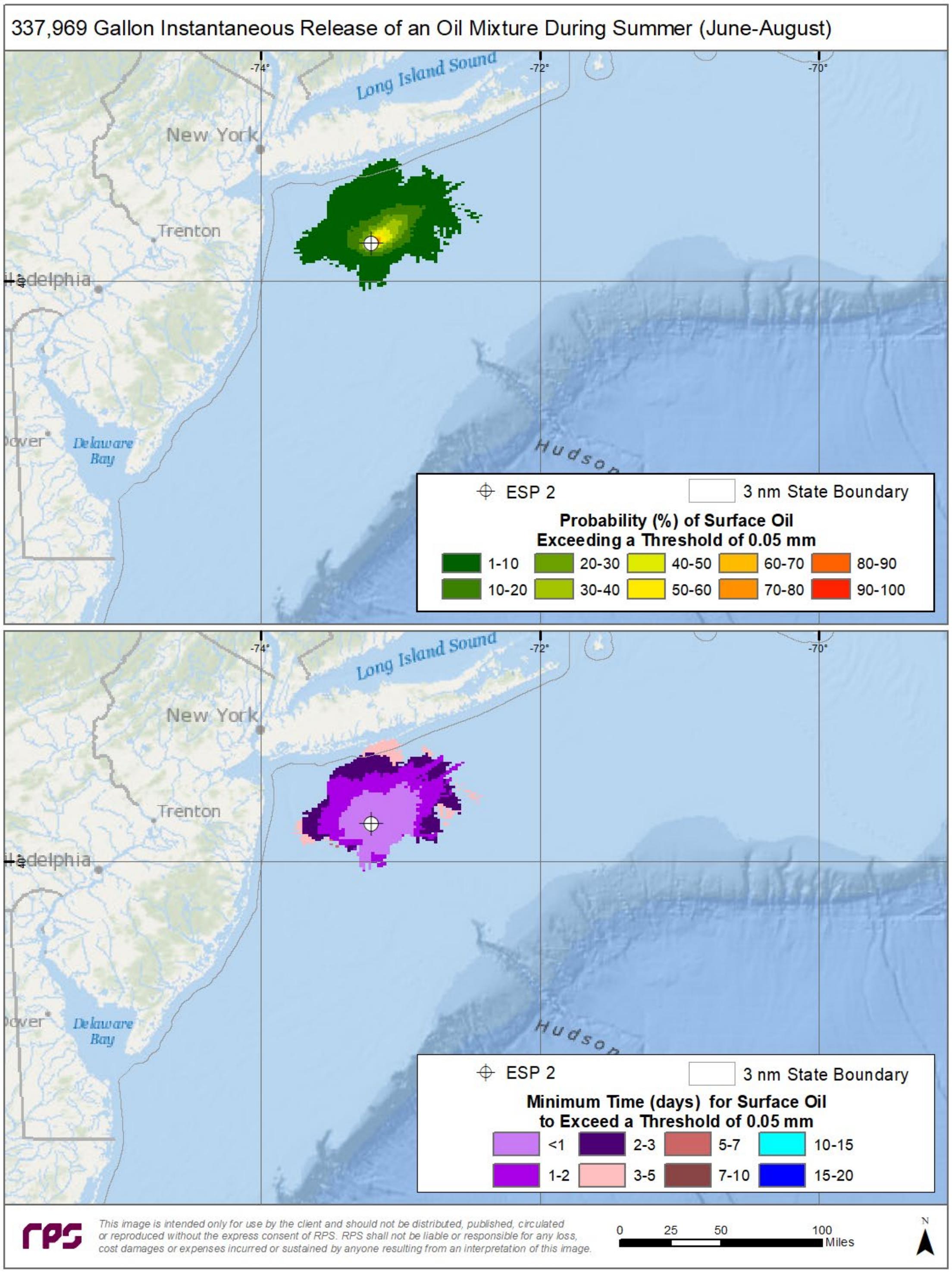


Figure 36. Top Panel–Probability of surface oiling above a minimum thickness of 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.05 mm.

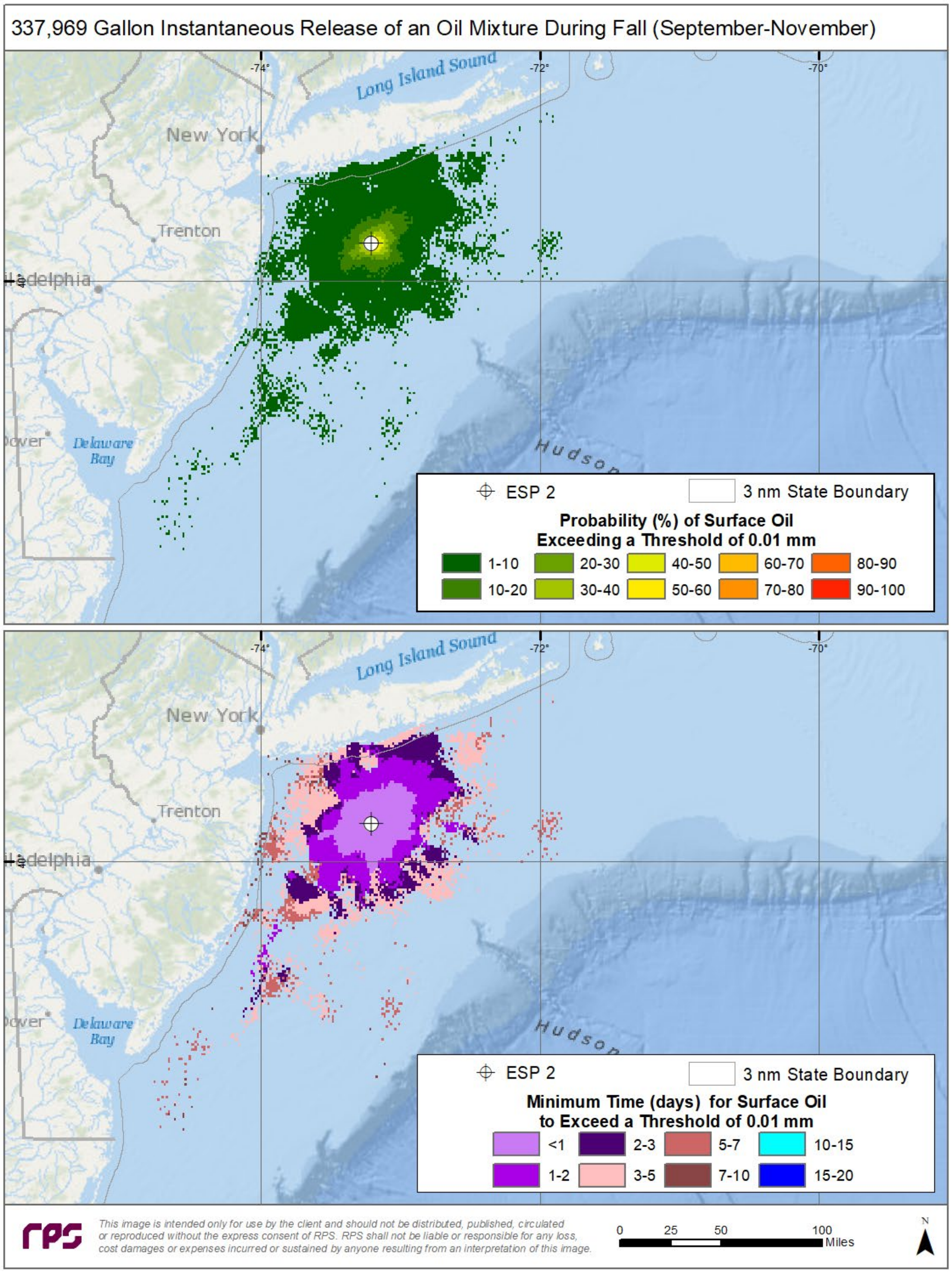


Figure 37. Top Panel—Probability of surface oiling above a minimum thickness of 0.01 mm (10 µm ≈ 10 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.01 mm.

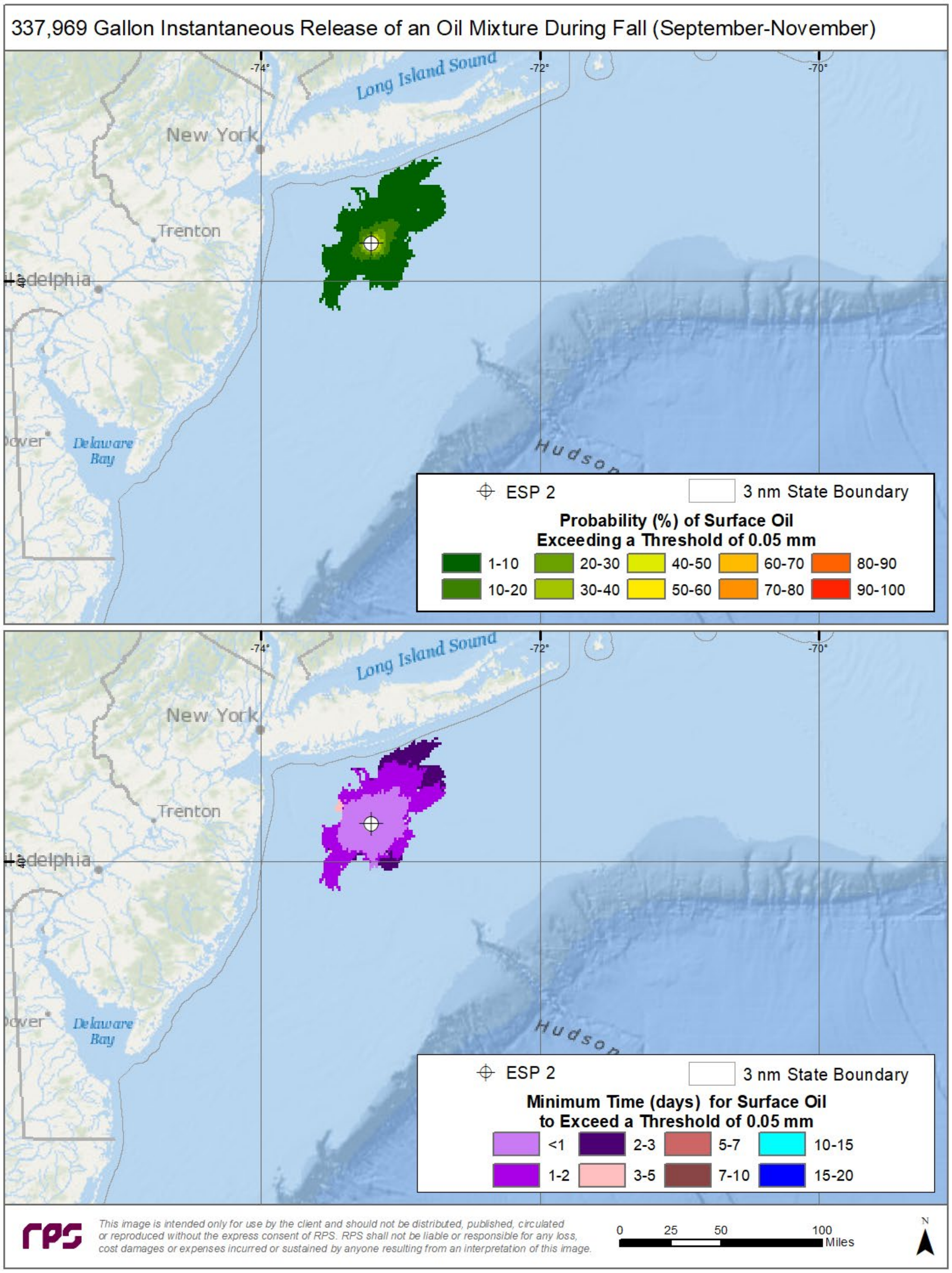


Figure 38. Top Panel—Probability of surface oiling above a minimum thickness of 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.05 mm.

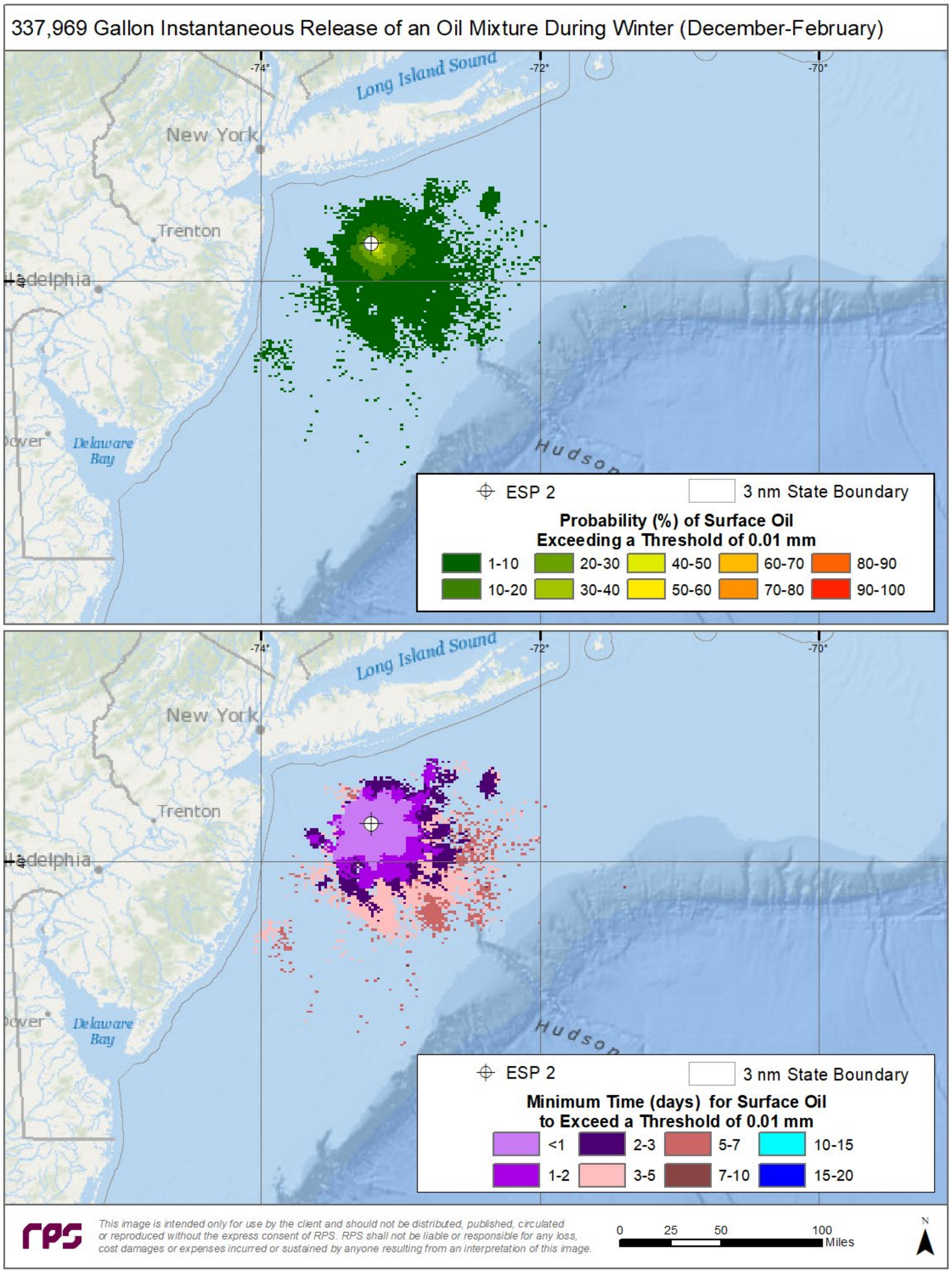


Figure 39. Top Panel—Probability of surface oiling above a minimum thickness of 0.01 mm (10 µm ≈ 10 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.01 mm.

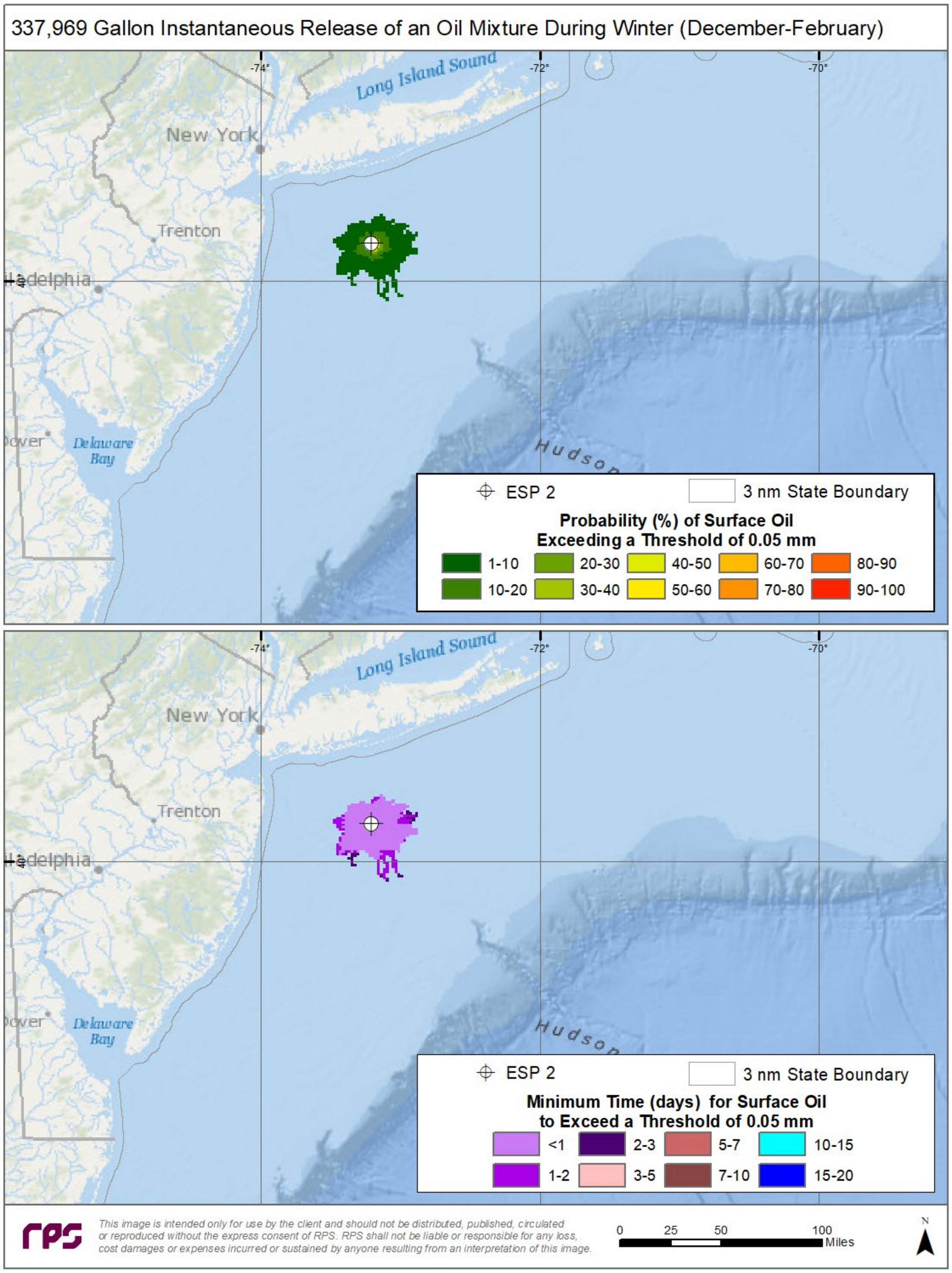


Figure 40. Top Panel—Probability of surface oiling above a minimum thickness of 0.05 mm (50 µm ≈ 50 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 0.05 mm.

4.2.2 Oil Contamination to Shore

The following figures illustrate the results of oil contamination to the shoreline for the spill scenarios over each season at the ESP 2 spill location. Figure 41 to Figure 44 indicate that, in all seasons, there is ≤10% probability that oil above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell; 0.004 in) released from the ESP 2 location would reach the shorelines of Long Island, New York and mid-to-south New Jersey within 20 days of the release. In the winter scenario, the predicted areas of shoreline probability >1% with oil contamination above a minimum thickness of 0.1 mm (0.004 in) were contained to the NJ coast and were predicted to hit the shoreline within seven to 10 days of the release.

The summer and fall scenarios are expected to have the largest spatial extent of shoreline oiling due to the prevailing winds and currents during these seasons. It is important to note again that these scenarios are very conservative and do not include the use of oil spill response equipment, which Vineyard Mid-Atlantic would implement in the case of a spill. Moreover, results associated with a threshold of 0.05 mm (0.002 in) indicate oil that is anticipated to be recoverable; therefore, if recovered within the timeframes specified, the overall shoreline oiling would likely be less than currently indicated. In reality, oil reaching the shores of New Jersey within the time-period of 10-13 days and beyond would be highly unlikely due to the oil response activities which would be enacted to prevent this shore oiling from occurring.

As described above and shown in Figure 20, the differences in the footprint for the surface and shoreline oil contamination are a result of the surface oil less than 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell; 0.004 in) traveling farther distances and beginning to pile up on shore. It is important to note that oil contamination to the shoreline has a cumulative effect over an individual run, since oil that hits the shoreline is stranded there, and more oil can accumulate.

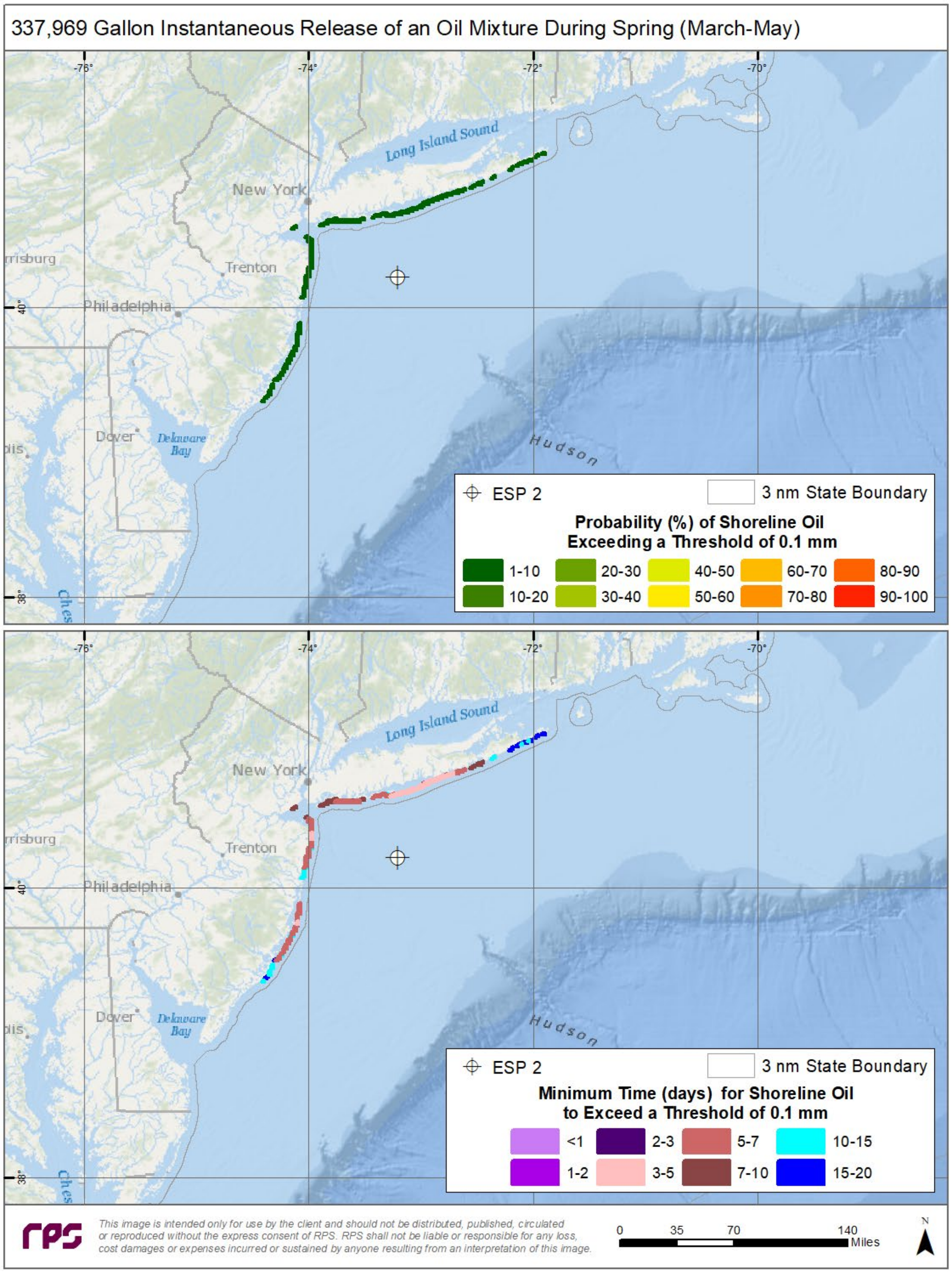


Figure 41. Top Panel—Probability of shoreline oiling above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 0.1 mm.

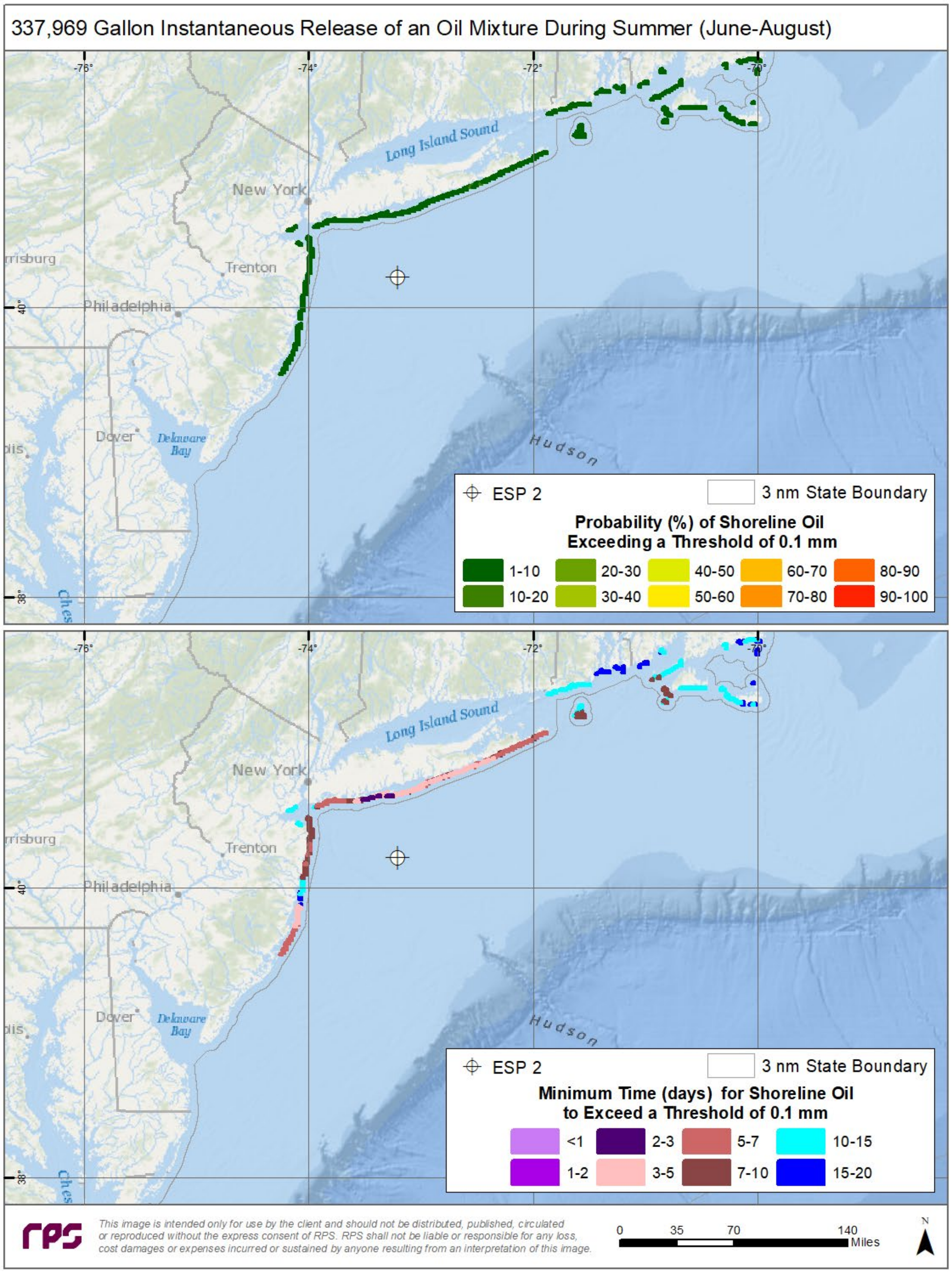


Figure 42. Top Panel—Probability of shoreline oiling above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 0.1 mm.

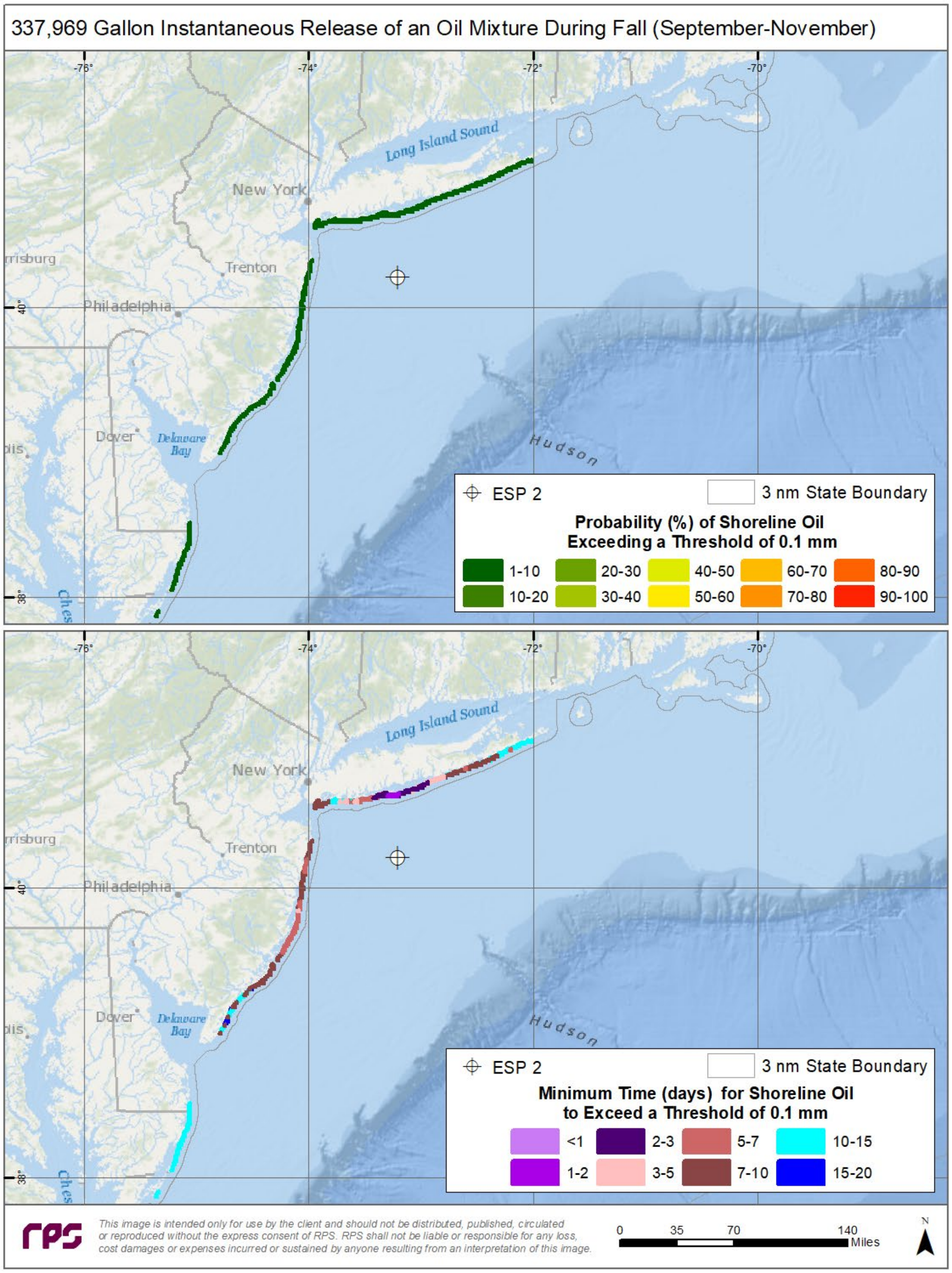


Figure 43. Top Panel—Probability of shoreline oiling above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 0.1 mm.

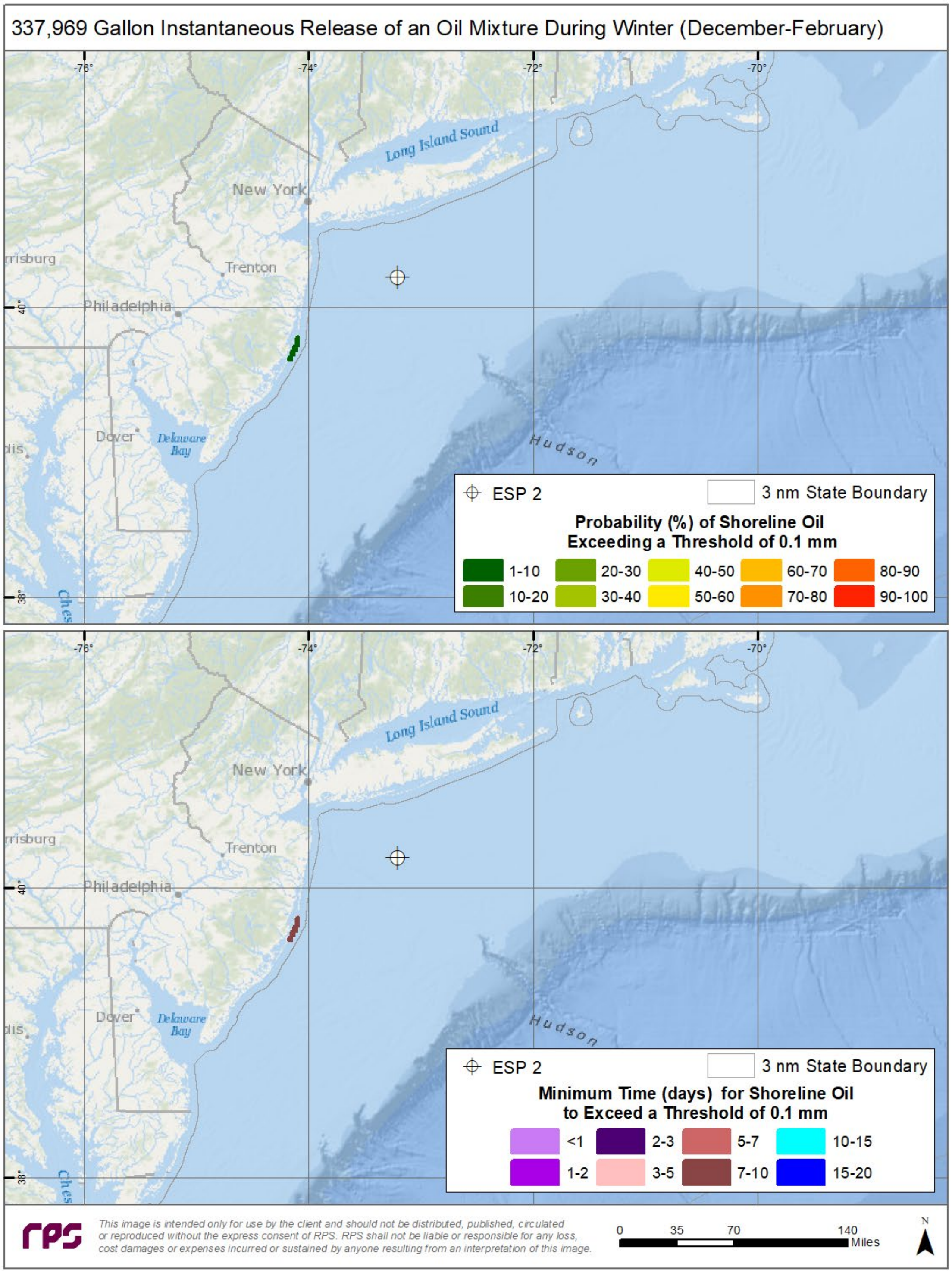


Figure 44. Top Panel—Probability of shoreline oiling above a minimum thickness of 0.1 mm (100 µm ≈ 100 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the ESP 2 location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 0.1 mm.

4.3 Conclusions

This oil spill modeling study assesses the trajectory and weathering of a catastrophic release of all oil contents from the topple of an ESP located within the Lease Area at two different locations for four different seasons. These are the most conservative (i.e., highest) discharge volume. Each of the scenarios simulate worst case discharges with an extremely small probability of such a catastrophic event occurring. In addition to the low probability of such events, the oil spill scenarios modeled in this study are for relatively small volumes compared to container vessel releases or oil well platforms. The scenarios also assume that no oil spill response or mitigation would occur, which is a very conservative assumption and would not happen in practice. In the event of a spill, response equipment employed on water would be used to prevent the spread of a spill; contain the oil to as small an area as possible; and protect sensitive areas before they are affected.

Based on the environmental datasets analyzed as input for the oil spill modeling, the following conclusions can be drawn:

- During winter months in the AOI, winds are predominantly west-northwesterly with higher speed. Throughout summer months, the winds are mostly south-southwesterly with lower speed. Spring and fall months show characteristics of transitional seasons.
- Annually-averaged HYCOM surface current near the spill sites is eastward with moderate speed.
- Predominant current direction is southeastward/east-southeastward during winter (December through February) and eastward/east-northeastward during summer (June through August). Spring (March through May) and fall (September through November) are the transitional seasons.

Based on the results of the stochastic spill trajectory analysis assessing potential spills of all oil contents of ESP 1 or ESP 2 within the Lease Area:

- The sea surface area exposed to oil exceeding the 0.01 mm (0.0004 in) threshold is predicted to be contained within a radius up to 200 km (124 mi) of the ESP 1 location and up to 180 km (112 mi) of the ESP 2 location for all four seasons. The sea surface area exposed to oil exceeding the 0.05 mm (0.002 in) threshold is predicted to be contained within a radius up to 75 km (47 mi) of the ESP 1 location and up to 60 km (37 mi) of the ESP 2 location for all four seasons.
- The stochastic footprint of exposed surface waters was smallest for the winter simulation, likely due to increased winds and surface waves that enhanced vertical entrainment into the water column.
- At the ESP 1 location for the spring, summer, and fall scenarios, there is <10% probability that oil above a minimum thickness of 0.1 mm (100 g/m^2 on average over the grid cell; 0.004 in) would reach the shorelines of Long Island, New York and mid-to-south New Jersey within 20 days of the release. In the winter scenario, the predicted areas of probability >1% with shoreline oil contamination above a minimum thickness of 0.1 mm (0.004 in) were contained to the New Jersey coast and were predicted to hit the shoreline within seven to 10 days of the release.
- From the ESP 2 location for the spring, summer, and fall scenarios, there is ≤10% probability that oil above a minimum thickness of 0.1 mm (100 $g/m^2 \approx 100$ g/m^2 on average over the grid cell; 0.004 in) would reach the shorelines of Long Island, New York and mid-to-south New Jersey within 20 days of the release. In the winter scenario, the predicted areas of probability >1% with shoreline oil contamination above a minimum thickness of 0.1 mm (0.004 in) were contained to the New Jersey coast and were predicted to hit the shoreline within seven to 10 days of the release.

As noted, the stochastic spill trajectory analysis conservatively assesses a catastrophic release of all oil contents from an ESP within the Lease Area. In the unlikely event of a worst-case discharge, Vineyard Mid-Atlantic plans to employ response equipment on water to prevent the spread of the spill; contain the oil to as small an area as possible; and protect sensitive areas before they are affected. Therefore, any potential impacts from an oil release are likely to be less than predicted by the conservative worst case discharge scenario.

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Appendix A – Oil Spill Modeling System - Description

OILMAP/SIMAP Introduction

OILMAP and SIMAP are part of RPS' comprehensive oil spill modeling system comprised of several interactive modules to reproduce the transport and fate of oil releases in different environments: land, water, and atmosphere. The impact assessment module – SIMAP – was derived from the physical fates and biological effects submodels in the Natural Resource Damage Assessment Models for Coastal and Marine and Great Lakes Environments (NRDAM/CME and NRDAM/GLE), which were developed for the U.S. Department of the Interior (USDOI) as the basis of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) Natural Resource Damage Assessment (NRDA) regulations for Type A assessments (French et al. 1996; Reed et al. 1996). The physical fates model has been validated with more than 20 case histories, including the *Exxon Valdez* and other large spills (French McCay 2003, 2004; French McCay and Rowe 2004), and test spills designed to verify the model's transport algorithms (French et al., 1997). The wildlife mortality model has also been validated with more than 20 case histories, including the *Exxon Valdez*, that verify the values are reasonable (French and Rines 1997; French McCay 2003, 2004; French McCay and Rowe 2004). The technical documentation for SIMAP is in French McCay (2003, 2004, 2009).

Applications for OILMAP/SIMAP include impact assessment; hindcast/forecast of spill response; Natural Resource Damage Assessment (NRDA); contingency planning; ecological risk assessment; cost-benefit analysis, and drills and education. The model may be run for a hindcast/forecast of a specific release or be used in stochastic mode to evaluate the probable distribution of contamination.

OILMAP/SIMAP contains several major components:

- The physical fates model estimates surface distribution and subsurface concentrations of the spilled oil and its components over time.
- The biological effects model estimates impacts resulting from a spill scenario on fish, invertebrates, wildlife, and for each of a series of habitats (environments) affected by the spill.
- The probability of impact from an oil discharge is quantified using the 3-D stochastic model.
- Currents that transport contaminant(s) and organisms are entered using the graphical user interface or generated using a (separate) hydrodynamic model. Alternatively, existing current data sets may be imported.
- Environmental, chemical, and biological databases supply required information to the model for computation of fates and effects.
- The user supplies information about the spill (time, place, oil type, and amount spilled) and some limited environmental conditions at the time (such as temperature and wind data).

As with RPS' other modeling systems, OILMAP/SIMAP is easily applied to a wide variety of conditions. It is set up and runs within RPS' standard Geographic Information System (GIS) or ESRI's ArcView™ GIS and can be applied to any aquatic environment (fresh or salt) in the world. It uses any of a variety of hydrodynamic data file formats (1-, 2- and 3-dimensional; time varying or constant) and allows 2-D vertically-averaged current files to be created within the program system when modeled currents are not available. Outputs include easily interpreted visual displays of dissolved and particulate concentrations and trajectories over time, as appropriate to the properties of the chemical being simulated. An optional biological exposure model is available to evaluate areas and volumes exposed above concentrations of concern and to predict the impacts on exposed fish and wildlife.

OILMAP/SIMAP specifically simulates the following processes:

- initial plume dynamics;
- slick spreading, transport, and entrainment of floating oil;
- evaporation and volatilization (to atmosphere);
- transport and dispersion of entrained oil and dissolved aromatics in the water column;
- dissolution and adsorption of entrained oil and dissolved aromatics to suspended sediments;
- sedimentation and re-suspension;
- natural degradation
- shoreline entrainment, and
- boom and dispersant effectiveness.

The physical and biological models require environmental, oil and biological data as inputs. One of RPS' strengths is the ability to synthesize data from disparate sources. The data come from many sources including government and private data services, field studies and research. Modeling techniques are used to fill in "holes" in the observational data, thus allowing complete specification of needed data. The environmental database is geographical, including data of the following types: coastline, bathymetry, shoreline type, ecological habitat type, and temporally varying ice coverage and temperature. This information is stored in the simplified geographic information system. The chemical database includes physical-chemical parameters for a wide variety of oils and petroleum products. Data have been compiled by RPS from existing, but diffuse, sources.

An oil spill is simulated using site-specific wind, current, and other environmental data gathered from existing information, on-line services, and/or field studies. Shoreline and habitat types, as well as bathymetry, are mapped and gridded for use as model input. The physical, chemical, and toxicological properties of the spilled oil are provided by the oil database or updated to the specific conditions of the release. The model estimates the fate of the oil over time. The model outputs are time-varying concentrations and mass per unit area on surfaces (i.e., water surface, shoreline, sediments), which quantifies exposure to aquatic biota and habitats. Atmospheric loading in space and time is also computed and provides input to air dispersion models.

Decay / Degradation Processes

Degradation, also known as decay, is the result of several processes in the water column and sea surface. Decay represents both biodegradation and photolysis. Photolysis is a chemical breakdown process energized by ultraviolet light from the sun as it penetrates the oceans sea surface layer. Biodegradation occurs when microbes metabolize oil as a carbon source, producing carbon dioxide and water as by-products. The biodegradable portion of various crude oils can vary, ranging from 11% to 90% (NRC 1985). Not all types of organisms utilize the same oil components, nor are all types of organisms present in all locations.

In the RPS oil spill model, degradation is applied to all oil components present in the sea surface, shoreline, and in the water column. The degradation rate captures all degradation processes (e.g., photolysis and biodegradation) and is calculated for each environmental compartment. Degradation rates are constant throughout the simulation and based on empirical evidence. Oil degradation rates in OILMAP's oil database are based on French et al., 1996. The following table lists the different degradation rates used in this modeling study for each compartment, expressed in day^{-1}. It should be noted that these rates are being re-evaluated based on new findings in particular for the water column; however, the rates used in this study can be considered conservative (i.e., slightly underestimating decay in the water column).

Table A-1. Oil Decay rates used in OILMAP for each marine compartment and oil components (THC range).

Environmental Compartment	Oil exposed to air (surface (0-1m), shoreline)	Oil in water column	Oil in sediments
Daily Decay Rate (1/day)	0.001	0.240 – THC1 (1-180 °C) 0.078 – THC2 (180-265 °C) 0.042 – THC3 (265-380 °C) 0.01 – Residual oil	0.001

Model Uncertainty / Limitations

The model has been developed over many years to include as much information as possible to simulate the fates and effects of oil spills. However, as in all science, there are significant gaps in knowledge and the ability to simulate the detailed behavior of organisms and ecosystems. Typically, assumptions based on available scientific information and professional judgment are made in the development of the model, which represent our best assessment of the processes and potential mechanisms for effects (consequences) that would result from oil spills.

The major sources of uncertainty in the oil fates and biological effects model are:

- Oil contains thousands of chemicals of varying physical and chemical properties that determine their fate in the environment. In addition, those chemicals (their properties) change over time. The model must treat the oil as a mixture of a limited number of hydrocarbon components, grouping chemicals by physical-chemical properties.
- The fates model contains a series of algorithms that are simplifications of complex physical-chemical processes. These processes are understood to varying degrees but can dramatically vary depending on the environmental conditions (e.g., cold vs warm waters).
- Organisms are assumed uniformly distributed in affected habitats they occupy for the duration of the spill simulation. The accuracy of this assumption varies between organisms, but the objective is to assess potential effects for an average-expected condition, which is what this assumption most closely resembles.
- Biological effects are quantified based on acute exposure and toxicity of contaminant concentrations as a function of degree and duration of exposure. The SIMAP model used is not designed to address long-term, chronic exposure to pollutants.
- The model treats each spill as an isolated pollution event and does not account for any potential cumulative effects.
- Various physical / environmental parameters including river flow, depth / sea bottom roughness, total suspended solids concentration, etc. were not sampled extensively at each location of the extended domain (hundreds of square kilometers). What limited data that did exist was applied to each location, leading to a certain degree of homogenization of the environmental (marine/coastal) conditions.

In addition, in any given oil spill, the fates and effects will be highly related to the specific environmental conditions, the precise locations of organisms, and a myriad of details related to the event. Thus, the results are a function of the scenarios simulated and the accuracy of the input data used. The goal of this study was not to capture every detail that could potentially occur, but to describe the range of possible consequences so that an informed analysis could be made as to the likely effects of spills under various scenarios. The model inputs are designed to provide representative conditions to such an analysis. Thus, the modeling is used to provide quantitative guidance in the analysis of the spill scenarios being considered.

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