UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT

BOEM NTL No. 2022-G01 Effective Date: October 1, 2022

NOTICE TO LESSEES AND OPERATORS OF FEDERAL
OIL AND GAS, AND SULPHUR LEASES IN THE
GULF OF MEXICO OUTER CONTINENTAL SHELF (OCS) REGION

Shallow Hazards Program

The Bureau of Ocean Energy Management (BOEM) is issuing this Notice to Lessees and Operators, (NTL) to provide guidance on BOEM's shallow hazards program on the Gulf of Mexico Outer Continental Shelf (OCS). This NTL supersedes and replaces NTL No. 2008-G05, dated May 1, 2008. Specifically, this NTL provides guidance regarding: (1) submittal of three-dimensional (3-D) seismic data for the evaluation of seafloor and subsurface geologic hazards in deepwater, reprocessing 3-D seismic to enhance the resolution, and submitting a power spectrum analysis curve for quality control; (2) use of a multi-beam survey along with single-beam echo-sounder; (3) use of multichannel acquisition and processing for the boomer source; (4) use of a gradiometer in areas of high concentration of ferrous materials like pipelines, platforms, and ferrous debris; (5) use of acquisition parameters to enhance high resolution two-dimensional (2-D) seismic surveys; (6) adjusting line spacing according to water depth; (7) submittal of high resolution shallow hazards survey data; and (8) submittal of a shallow hazards assessment for unapproved, proposed wells in an Exploration Plan (EP), a Development Operations Coordination Document (DOCD) or a Development and Production Plan (DPP).

I. Introduction

Pursuant to 30 CFR 550.120, BOEM's Gulf of Mexico Regional Office (GOMR) has established a shallow hazards program to ensure that human, marine, and coastal environments are protected when lessees conduct exploration, development, production, and transportation operations in support of energy resource development. Under that program, this NTL provides recommendations regarding shallow hazards assessments, surveys, and reports required by 30 CFR 550.214(e)-(f) for EPs and 550.244(e)-(f) for DOCDs and DPPs by providing examples of the type and format of information BOEM recommends be included in a shallow hazards assessment or report. This NTL does not provide guidance for shallow hazards surveys or reports required by the Bureau of Safety and Environmental Enforcement (BSEE) for pipeline applications. For all pipeline-related activities, including pre-installation survey design pursuant to 30 CFR 250.1007(a)(5), contact the BSEE GOMR Pipeline Section Chief. (See Contacts and Mailing Addresses section).

II. Shallow Hazards Assessments

Pursuant to 30 CFR 550.214(f) and 550.244(f), you must include a shallow hazards assessment in your EP, DOCD or DPP for each well proposed at an unapproved surface location. Pursuant

to 30 CFR 550.283(a)(2), you must revise your approved EP, DOCD or DPP to include a new shallow hazards assessment when you propose to change the approved surface location of a well or production platform by a distance more than that specified by the Regional Supervisor.

Pursuant to 30 CFR 550.214(f) and 550.244(f), you must submit an assessment of all seafloor features, subsurface geology, man-made features, and conditions that may adversely affect your proposed drilling operations. BOEM recommends that your shallow hazards assessment provide the following:

1. A discussion of all available geological and geophysical data within 300 meters (985 feet) of each proposed well site to a depth of 1,000 meters (3,280 feet) below the seafloor or 200m (656 feet) below the surface casing depth, whichever is deeper.
2. A discussion of all seafloor features, subsurface geology, man-made features, and conditions that may adversely affect your proposed drilling operations.
3. An interpreted hazards map with wells annotated.
4. A discussion of any special safety measures that would minimize the adverse effects of shallow hazards.
5. A top-hole prognosis diagram, and percentage power spectrum analysis curve at each proposed well location, seafloor "rendering" or shaded relief map, and a seafloor amplitude map if you are using 3-D seismic reflection data in lieu of high-resolution data to prepare the shallow hazards assessment. As 3-D seismic reflection data does not allow for adequate evaluation of archaeological resources or man-made features (e.g., pipelines, wellheads), the use of side-scan sonar or multi-beam sonar to obtain high-resolution seafloor data is recommended.
6. Digital copies of all raster and vector files used in the survey maps. Refer to section IV, paragraph A, of this NTL.

III. Shallow Hazards Surveys

Pursuant to 30 CFR 550.214(e) and 550.244(e), you must include in your EP, DOCD or DPP, a shallow hazards report (or a reference to a previously submitted report by contractor name and date) based on the information obtained from a high-resolution geophysical survey ("shallow hazards survey"). BOEM recommends that you perform your shallow hazards surveys by using the navigation systems, survey design, and data acquisition instrumentation described in paragraphs A through C below.

A. Recommended Navigation Systems

BOEM recommends that you use a state-of-the-art navigation system that can continuously determine the surface position of the survey vessel with a precision of ± 5 meters (16 feet). You should continuously log position fixes digitally along the vessel track and annotate them on all records at intervals no greater than 150 meters (490 feet). For surveys you conduct in water depths of 200 meters (656 feet) or greater, you should use an acoustic positioning system for the deep tow system or autonomous underwater vehicle (AUV) to ensure accurate mapping of any recorded contacts.

B. Recommended Survey Design

BOEM recommends that the survey design (line spacing and layout) for each type of shallow hazards survey cover the area of anticipated physical disturbances (survey does not need to include work boat anchor locations or similar minimal disturbances, but permanent anchor locations should be covered). All proposed unapproved surface locations should be located on or very near a high-resolution survey line whenever feasible. The maximum expected line spacing for each type of survey listed below should be150 meters (492 feet) (unless it does not meet the criteria of 100% coverage of multi-beam survey on the seafloor, 150% overlap of the seafloor between any two adjacent side-scan sonar survey lines, and recommended archaeological survey line spacing requirements if the shallow hazards survey is also being used to comply with archaeological reporting needs):

1. Lease Survey - A lease survey covers the entire area of a lease, as well as areas external to the lease, to provide coverage of an area at least 300 meters (985 feet) square centered upon any well site, and areas within which activities may cause physical disturbances.
2. Site-Specific Survey - A site-specific survey covers an area at least 1,800 meters (5,900 feet) square centered upon a proposed drilling or platform site, as well as that portion external to the area within which activities may cause physical disturbances.
3. Seafloor Obstruction Survey - A seafloor obstruction survey is run to locate existing pipelines and other potential natural and man-made hazards prior to operations. You should run a seafloor obstruction survey for a well or platform in an area at least 300 meters (985 feet) square with three equidistant primary lines and at least one cross line. You would not need to conduct a seafloor obstruction survey if the data from previously conducted surveys are adequate to accomplish this purpose.

C. Recommended Data Acquisition Instrumentation

BOEM recommends that you record all data digitally at a sampling rate of at least one sample per second and that all data recorders to the navigation system be interfaced to ensure proper integration of information. You may acquire bathymetry data using a multi-beam echo-sounder bathymetry system that provides high quality full coverage over the survey area. You may use single-beam echo-sounder data to verify the results.

1. Magnetometer

   In water depths of less than 200 meters (656 feet), BOEM recommends that you use a total field intensity magnetometer to determine the presence of pipelines and other magnetically susceptible objects in accordance with industry standards for this water depth. Under this approach, you should tow the magnetometer sensor as close as possible to the seafloor (no more than 6 meters (20 feet) altitude). BOEM recommends that you use a magnetometer with a sensitivity of 1 gamma or less and a background noise level that does not exceed a total of 3 gammas peak-to-peak. A gradiometer system is recommended for use in the vicinity of large infrastructure such as platforms, congested pipelines, or ferrous debris for more precise results.

2. Side-scan Sonar

BOEM recommends that you acquire side-scan sonar data to record continuous non-contoured planimetric images of the seafloor that provides for the detection and evaluation of seafloor objects and features 0.5 meter in size at maximum range within the survey area. A mosaic may be constructed with a digital map format described in the last paragraph of section IV, paragraph A, of this NTL. The recommended system would provide 150 percent overlap of the seafloor between any two adjacent survey lines. The following table provides the suggested range of fish altitude for coverage areas:

Height Above Seafloor	Range at 10 Percent of Fish Altitude	Range at 20 Percent of Fish Altitude
5 meters	50 meters/channel	25 meters/channel
10 meters	100 meters/channel	50 meters/channel
15 meters	150 meters/channel	75 meters/channel
20 meters	200 meters/channel	100 meters/channel

3. Shallow Penetration Sub-Bottom Profiler

An acoustic sub-bottom profiler system is recommended to determine the character of near-surface geological features. Such a system should be capable of achieving resolution of vertical bed separation of at least 0.3 meter (1 foot) in the upper-most 15 meters (50 feet) or greater. BOEM recommends that you run the shallow penetration sub-bottom profiler with a deep tow system or use an AUV.

4. 2-D Multi-Channel High Resolution Seismic

A multi-channel high resolution seismic survey is recommended to determine the character of deeper geological features. BOEM recommends that the profiler system be capable of penetrating at least 1,000 meters (3,280 feet) or 200 meters below potential surface casing depth, whichever is greater, and that the vertical resolution be less than 6 meters (20 feet). BOEM also recommends that you acquire the data digitally. Per industry best practices, this involves using 24 channels (or more) at group intervals of 12.5 meters and processing the data (time migration) to enhance the interpretation.

5. 3-D Seismic Reflection Surveys

For areas in water depths greater than 200 meters (656 feet), BOEM recommends that you acquire a 3-D seismic reflection survey for subsurface hazards over 100 percent of the area. The 3-D seismic data is processed in a manner to contain a frequency of 60 hertz (Hz) or more at one half the percentage power spectrum analysis curves at each proposed well location for the upper one second from the seafloor. The minimum recommended coverage area for 3-D data is the same as that for high-resolution surveys as described in Section III, paragraph B (Recommended Survey Design).

6. Original Shallow Hazards Survey Data and Information Retention

   Pursuant to 30 CFR 550.210(b), if you conduct ancillary activities, you must retain copies of all original shallow hazards survey data and information, including navigation data, and make it available to BOEM upon request at any time prior to lease termination.

IV. Shallow Hazards Reports

Pursuant to 30 CFR 550.214(e), and 550.244(e), you must include in your EP, DOCD or DPP a shallow hazards report (or a reference to a previously submitted report by contractor name and date) based on the information obtained from a shallow hazards survey. BOEM recommends that your shallow hazards report provide the following information:

A. General

In the shallow hazards report, you should include an evaluation and synthesis of the data you gathered during the shallow hazards survey and integrate it with other available geological and geophysical information with compatible local projections. Your report should be prepared, signed, and dated by a geophysicist or geologist specializing in high-resolution geophysical interpretation. You do not need to prepare a separate report for a seafloor obstruction survey; instead, you may include it as part of the shallow hazards report.

To minimize possible delays in the review of your EP, DOCD or DPP, you may submit a shallow hazards report to the BOEM GOMR Plans Section (reports for lease surveys or site-specific surveys) before you submit the related EP, DOCD or DPP.

When you submit your report, you should provide one digital copy (DVD, CD, or mutually acceptable digital storage media).

When submitting your shallow hazards report on USB drives or similar digital storage media that are encrypted, you should make sure that it is a complete report (including all text, maps, sample seismic lines, geohazard shape files, and other graphics). You should submit the report as a non-editable (read-only) digital file in portable document format (PDF) with all maps and seismic data. In addition, you should submit digital copies of all vector files used in the survey maps as shapefiles (.SHP) and AutoCAD drawing files (.DWG) for each individual layer group. BOEM strongly prefers the use of GIS shape files in non-proprietary formats. You should submit all raster files used in the survey maps (e.g. side scan sonar imagery and amplitude/seafloor renderings) as high resolution GEOTIFF files. All raster and vector files should be submitted as ArcPro compatible, oriented to the NAD 27 datum, and projected in the correct UTM US feet coordinate system. The use of a map package (.MPK) or a geodatabase (.GDB) is strongly preferred as a method to organize and submit your required GIS data. You should submit accompanying computer-aided design (CAD) files in layers as shown in Appendix 1. You should submit a copy of sub-bottom profiler and processed 2-D or 3-D seismic data formatted in standard SEG-Y format as shown in Appendix 2.

B. Recommended Report Contents

BOEM recommends that you include the following information in your shallow hazards report:

1. Area Description - A description of the area that you surveyed that includes the:
    - OCS lease number(s), block number(s), and lease area(s)
    - Minimum and maximum water depths of the survey area

2. Personnel List - A list of the individuals involved in survey planning, fieldwork, and report preparation, and their corresponding position titles.

3. Survey Description - A discussion of the shallow hazards survey that includes:
    - a brief description of the navigation system
    - a brief description of survey instrumentation
    - a description or diagram of the survey vessel, including its size and sensor configuration
    - vessel speed, direction, and course changes
    - sea state and weather conditions
    - a copy of the daily survey operations log
    - a description of survey procedures

4. Maps – Submit digital maps at a scale of 1:12,000 (or 1:24,000 if the survey report involves multiple OCS blocks) and oriented to true north. All map symbols should match the International Association of Oil & Gas Producers (IOGP) Seabed Survey Data Model (SSDM) when applicable (**http://www.iogp.org/Geomatics#2521682-seabed-survey-data-model**). Include on the maps:
    - a navigation post-plot of the surveyed area, showing lease block lines, latitude-longitude reference coordinates, survey lines and directions, and navigational shot points at intervals of no more than 150 meters (490 feet)
    - bathymetry (at contour intervals of 0.3 meters (1 foot) to 15 meters (50 feet) depending on seafloor morphology)
    - multi-beam seafloor rendering
    - side-scan sonar mosaic
    - seafloor and shallow geologic features
    - deep geologic structures (from medium penetration profiler data)
    - side-scan sonar contacts
    - magnetic anomalies
    - areas of shallow gas
    - sites of proposed and former oil and gas operations
    - location of significant OCS sediment resources in water depths less than 30 meters (100 feet). For more information, refer to NTL No. 2009-G04, *Significant OCS Sediment Resources in the Gulf of Mexico*, January 27, 2009.

5. Assessment or Analysis – An assessment or analysis of the potential for shallow hazards within the surveyed area, including, but not limited to, discussions of:
    - the general geological background

- oil and gas activity, including wells, platforms, and pipelines
- bathymetry
- seafloor features and deepwater benthic communities, including side-scan sonar contacts or ROV video documentation
- geological structures, including faults, river channels, and karsts areas
- shallow gas, gas hydrate, and shallow-water flows
- magnetic anomalies
- proximity to any significant OCS sediment resources
- unstable seafloor areas

6. Magnetic anomalies – A list of all magnetic anomalies of unknown source in a "comma delimited" (ASCII) text file using the following format:
    - Anomaly Number, Area, Block Number, Line Number, Shot Point, Tow Height, Signature, Intensity, Duration, NAD 27 Latitude, NAD 27 Longitude, NAD 83 Latitude, NAD 83 Longitude, Avoidance Distance, NAD 27 X Coordinate, NAD 27 Y Coordinate, Coordinate System Number Code
    - Latitude/longitude may be provided to six decimal places.
    - BOEM recommends that you also provide the above information in a tabular format in the report.

7. Side-scan Sonar Contacts - A list of all side-scan sonar contacts of unknown source in a "comma delimited" (ASCII) text file using the following format:

Sonar Contact Number, Area, Block Number, Line Number, Shot Point, Length, Width, Height, Shape, NAD 27 Latitude, NAD 27 Longitude, NAD 83 Latitude, NAD 83 Longitude, Avoidance Distance, NAD 27 X Coordinate, NAD 27 Y Coordinate, Coordinate System Number Code.

8. 3-D Seismic Reflection Data – If you are using 3-D seismic reflection data to prepare your report in lieu of 2-D high resolution data for the evaluation of subsurface hazards, BOEM recommends that you provide the following additional information to assist BOEM in its review:
    - a discussion of the acquisition and processing of the 3-D seismic data you used
    - a seafloor "rendering" or shaded seafloor features
    - seafloor amplitude using a scale with red as the greatest amplitude and blue as the lowest amplitude
    - a time to depth conversion table for surveys in frontier areas
    - tophole prognoses table summarizing potential geohazards with portions of seismic sections (inline and cross line) passing through the proposed well at least one thousand feet along both sides
    - normalized power spectrum for the upper one second from the seafloor at each well location

V. Additional Information

Pursuant to 30 CFR 550.202, EPs, DOCDs or DPPs must demonstrate that an operator has planned and is prepared to conduct the proposed activities in a manner that conforms to all applicable laws, implementing regulations, and lease terms and stipulations, and is safe; conforms to sound conservation practices and protects the rights of the lessor; does not unreasonably interfere with other uses of the OCS, including those involved with National security or defense; and does not cause undue or serious harm or damage to the human, marine or coastal environment. You must exercise one of the following procedures for mitigation of potential shallow hazards identified through shallow hazards surveys and reports and/or shallow hazards assessments, or where BOEM's review of your analysis indicates a potential hazard within the immediate area (see below for description of "immediate area") of your proposed operations:

1. Amend your EP, DOCD or DPP to locate the site of the operations to avoid the potential shallow hazard;
2. Submit information to BOEM GOMR that demonstrates that the use of special protective measures will minimize the risk to safe operations or to the shallow hazard; or
3. Submit information to BOEM GOMR that establishes that such operations will not be adversely affected by the shallow hazard and the shallow hazard will not be affected by the proposed activity.

For magnetic anomalies with an intensity 50 gammas or greater and side-scan sonar contacts, the immediate area is the area inside a circle centered on the feature with a radius of 30 meters (100 feet). You may change this avoidance distance depending upon the signature, intensity, ambient magnetic field, and duration of any individual anomaly or contact. For geologic features, the immediate area includes any site located within a radius of 75 meters (245 feet) of the feature. For areas designated as significant OCS sediment resources, refer to NTL No. 2009-G04.

Guidance Document Statement

BOEM issues NTLs as guidance documents in accordance with 30 CFR 550.103 to clarify and provide more detail about certain BOEM regulatory requirements, and to outline the recommended information to be provided in various submittals.

This NTL is intended to provide clarity to the public regarding existing requirements under the law and regulations. To the extent that provisions of this NTL derive from requirements established by statute, regulation, or by a provision in the lease, they should be considered as BOEM's description of the specific requirements of those statutes, regulations, and leases, and are, therefore, enforceable as legal requirements. The provisions of this NTL may also be made mandatory in whole or part through stipulations or conditions of approval from BOEM in leases, plans, permits, or other authorizations. To the extent any provision is not derived from requirements established by statute, regulation or a provision in a lease or condition of approval, it serves as a recommendation as to best practice and not an independent mandate.

Paperwork Reduction Act of 1995 Statement

An agency may not conduct or sponsor a collection of information unless it displays a currently valid OMB Control Number. OMB has approved the information collection requirements in 30 CFR part 550, subpart B, under OMB . This guidance document does not impose any additional information collection requirements subject to the Paperwork Reduction Act of 1995.

Contacts and Mailing Addresses

A. Contacts

The following table provides contact names, email addresses, and telephone numbers if you have any questions on shallow hazards surveys, assessments, or reports.

Item	GOMR	Email Address	Phone Number
Shallow hazards reports or assessments in EPs, DOCDs, and DPPs	Plans Section Chief	**BOEMGOMRPlans@boem.gov**	(504) 736-2545
Conducting shallow hazards surveys or preparing shallow hazards reports or assessments	Resource Studies Section Chief	**GeoHazardGOMR@boem.gov**	(504) 731-7832
Working within, or within 1000 feet of an area designated as Significant OCS Sediment Resources	Office of Environment Regional Supervisor	**mmpgomr@boem.gov**	(504) 736-2759
Pre-pipeline Applications	Pipeline Section Chief	**BSEEPipelines@bsee.gov**	(504) 736-2876

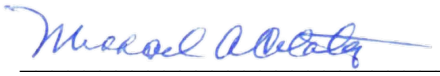
B. Mailing Addresses

The following provides the mailing addresses for the respective BOEM GOMR offices and BSEE GOMR office where you submit shallow hazards reports or assessments/analyses and any requests regarding shallow hazards surveys, assessments/analyses, or reports:

For...	Insert in blank space below
BOEM GOMR Leasing and Plans	Plans Section (MS 235D)
BOEM GOMR Resource Evaluation	Resource Studies Section (GM881A)
BSEE GOMR Pipeline	Pipeline Section (GE 1035A)

U.S. Department of the Interior
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
Office of [Leasing and Plans] or [Resource Evaluation]
Attention: Regional Supervisor of Leasing and Plans or Resource Evaluation

U.S Department of the Interior
Bureau of Safety and Environmental Enforcement
Gulf of Mexico OCS Region
Office of Field Operations [Pipeline]
Attention: Regional Supervisor for Field Operations
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394



September 7, 2022

Michael Celata
Regional Director, Gulf of Mexico Regional Office
Bureau of Ocean Energy Management
Department of Interior Regions 1, 2, 4 and 6

Date

Appendix 1

BOEM Recommended Format for Digital Maps

BOEM recommends that you use the following format for digital maps (ArcGIS/ArcPro):

All map symbols should match the IOGP SSDM when applicable.

Group 0

Label the first layer as the base map or number zero (0). This layer is the base layer on which all other layers are created. It contains the background data used for plotting features, lines, points, etc. It is not the layer on which points, lines, features, labels, etc. are visible.

General Information Group (layers 100-199)

Layers 100 through 199 contain all pertinent reference information found on the map (including labels, block lines, and other reference information for the overall map). This layer is separate from the location of data features on the map. It serves only as a legend and background information for understanding the data placed on the overall map. BOEM recommends that you include the following layers in this group:

1. Overall legend including all symbols used for depiction of:
   (a) infrastructure such as pipelines and wellheads;
   (b) biological features including live bottoms, topographic features, and chemosynthetic communities;
   (c) geophysical characteristics such as acoustic voids or faults; and
   (d) other features such as unidentified magnetic anomalies and side-scan sonar contacts (with avoidance radii), buried channels, and shipwrecks.

2. It is recommended that each item is keyed into a legend and appears as a separate layer within one of the following items:
   (a) project area map;
   (b) map scale;
   (c) map title;
   (d) company names;
   (e) personnel names, dates, file and job numbers, and map numbers (e.g., map 1 of 2);
   (f) map borders;
   (g) true north arrow;

(h) OCS Protraction Area name(s) and block number(s);
(i) lease numbers;
(j) Federal/State boundaries;
(k) graticules used in delineating latitude and longitude;
(l) tic marks used to delineate State plane or UTM coordinates;
(m) table of unidentified sonar contacts depicted on the map (when appropriate); and
(n) table of unidentified magnetic anomalies (when appropriate).

Infrastructure Group (layers 200-299)

Layers 200 through 299 contain all industry infrastructure. BOEM recommends that all labels pertaining to infrastructure in this group be placed on a separate layer (i.e., all pipeline, borehole, well and structure removal labels may be on one layer and that layer located within the category of infrastructure). The following layers may be included in this group:

(a) pipelines;
(b) boreholes;
(c) capped wells;
(d) proposed activities;
(e) fairways and anchorage areas; and
(f) removed structures.

Navigation Data and Bathymetry Group (layers 300-399)

Layers 300 through 399 contain the post-plot of the navigation data as well as all bathymetric data. BOEM recommends that you place all labels pertaining to the post-plot of navigation data or bathymetry data in this group on a separate layer (i.e., all shot points and line labels may be on one layer and that layer located within the category of navigation data). The following layers may be included in this group:

(a) survey lines and shot points; and
(b) bathymetry data.

Seafloor Features Group (layers 400-499)

Layers 400 through 499 may contain all of the geological features and unidentified side-scan sonar contacts and magnetic anomalies located by the shallow hazards survey. BOEM recommends that you identify these features and anomalies with their appropriate symbols. It is recommended that all labels pertaining to these individual features be placed in separate layers (magnetic anomalies have a layer that has only labels corresponding to the individual magnetometer targets; unidentified side-scan sonar contacts have their own label layer; etc.). The following layers may be included in this group:

(a) unidentified side-scan sonar contacts;
(b) unidentified magnetic anomalies;
(c) artificial reefs and artificial reef planning areas;
(d) seafloor fluid expulsion features and gas vents;
(e) brine seeps and brine pools;
(f) seafloor scarps with height;
(g) mounds and pinnacles;
(h) organic reefs and relict reefs;
(i) deepwater coral locations (e.g., Lophelia reefs);
(j) outcrops and hard bottoms;
(k) live bottoms (pinnacle trend);
(l) named topographic features and their protection zones;
(m) seafloor faults;
(n) areas of seafloor slumping, debris flows, mud slides, and collapse depressions;
(o) seafloor hydrate features;
(p) scour and furrows;
(q) natural and dredged channels; and
(r) other seafloor features and anomalies (e.g., shipwrecks, pockmarks, can holes).

Subsurface Features Group (layers 500-599)

BOEM recommends that layers 500-599 contain all subsurface features located by the shallow hazards survey. You may place all labels pertaining to these individual features in separate layers (e.g., all labels for channel margin features should be on one layer). The following layers may be included in this group:

(a) buried faults with depth labels;
(b) shallow gas as seen on shallow penetration sub-bottom profiler (acoustic voids);
(c) shallow gas as seen on medium penetration seismic profiler or conventional seismic reflection data (2-D or 3-D) (high amplitudes, bright spots) with depth labels;
(d) buried slumping;
(e) buried hydrates (e.g., bottom simulating reflector (BSR), seismic blanking);
(f) shallow water flow zones;
(g) salt;
(h) significant geologic features;
(i) karst features; and
(j) buried channel features.

Appendix 2

BOEM Recommended Standard SEG-Y Submittal Format

Deliverable items for 2-D seismic data (a table, SEG-Y Submittal: 2D Seismic Data, as a suggested format for reporting information about the 2-D seismic dataset and to ensure proper loading of the data):

1. Project or seismic program name, acquisition method, protraction area, block and Lease number;
2. Two-dimensional final processed seismic lines recorded on USB external hard drive (formatted using ext2 or ext3 Linux format) in SEG-Y standard exchange format
3. A digital copy of SEG-Y byte positions for the two-dimensional data;
4. A separate document listing the first and last shot point and CDP for each line;
5. A final edited ASCII navigation file formatted in standard SEG-P1 or UKOOA P1-90 format. Identify line name and locations for the first, last, and every tenth SP including latitude/longitude, and projected XY locations on USB. Identify the geocentric ellipsoid used as a reference for the data and the associated projection system used. This information should be provided in a single file;
6. A digital copy of the processing sequences that were applied to the data on USB; and
7. A digital image plot of the survey, projected with OCS blocks on USB.

Deliverable items for 3-D seismic data (a table, SEG-Y Submittal: 3D Seismic Data, as a suggested format for reporting information about the 3D seismic dataset and to ensure proper loading of the data):

1. Project or seismic program name, acquisition method, protraction area, block and lease number;
2. Original 3D survey name;
3. Original 3D survey date of acquisition;
4. Company that shot the original survey;
5. Permit number under which the original seismic survey was acquired;
6. Three-dimensional final processed and migrated seismic volume(s) recorded on USB external hard drive (formatted using ext2 or ext3 Linux format) in SEG-Y standard exchange format;
7. Digital copies of SEG-Y byte positions for the three-dimensional digital data. Listings of the seismic lines on each data tape. Digital copies of workstations loading parameters for the data set, including survey azimuth, in-line spacing, trace or CDP spacing, sample rate, record length and the latitude, longitude, line number, trace number for each corner position, (upper

left, lower left, upper right, and lower right) recorded on USB. Identify the geocentric ellipsoid used as a reference for the data and the associated projection system used;
8. A digital copy of the processing sequences that were applied to the data, along with digital images of the bin-centered maps on USB;
9. Digital bin-centered data of final locations associated with the survey(s) (first and last bin-centered points for each line) recorded on USB in SEG-P1 or UKOOA P1-90 format. Identify the geocentric ellipsoid used as a reference for the data and the associated projection system used; and
10. A digital image plot of the survey, projected with OCS blocks.