UNITED STATES GOVERNMENT May 22, 2018
MEMORANDUM

To: Public Information (MS 5030)
From: Plan Coordinator, FO, Plans Section (MS 5231)

Subject: Public Information copy of plan
Control # - R-06704
Type - Revised Exploration Plan
Lease(s) - OCS-G19966 Block - 562 Mississippi Canyon Area
Operator - BP Exploration & Production Inc.
Description - Subsea Wells B and B-1
Rig Type - Not Found

Attached is a copy of the subject plan.

It has been deemed submitted as of this date and is under review for approval.

Michelle Griffitt
Plan Coordinator

| **Site Type/Name** | **Botm Lse/Area/Blk** | **Surface Location** | **Surf Lse/Area/Blk** |
|---|---|---|---|
| WELL/B | G19966/MC/562 | 3419 FNL, 5306 FEL | G19966/MC/562 |
| WELL/B-1 | G19966/MC/562 | 3441 FNL, 5273 FEL | G19966/MC/562 |

**Adalberto Garcia**
Regulations and Permitting Advisor
Gulf of Mexico Region

**BP Exploration & Production Inc.**
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April 19, 2018

Via FedEx

Ms. Ann Glazner
Deputy Regional Supervisor/ Leasing & Plans
Bureau of Ocean Energy Management
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

Attention: Michelle Griffitt-Evans, Mail Stop GM 1053C

Reference: Revised Exploration Plan, Isabela 2 MC562 002 Prospect
Mississippi Canyon Block 562, Lease OCS-G 19966

Gentlemen:

BP Exploration and Production Inc. (BP) submits for your review and approval a Revised Exploration Plan (EP) for the Isabela 2 MC562 002 Prospect, Mississippi Canyon Block 562, Lease OCS-G 19966. This revised EP provides for the drilling and completion of one (1) well at primary location (B). The plan also includes a mirror location at alternate location (B-1) which is included only for re-spud purposes.

Enclosed please find the following:

- One hard copy and one digital copy each of the Revised EP proprietary and public versions for BOEM review.

If you have any questions or need additional information please, contact the undersigned at Adalberto.Garcia@bp.com, or (832) 619-4852 office or (281) 995-2815 cell.

Sincerely,

Adalberto Garcia
Regulations and Permitting Advisor

# BP Exploration & Production Inc.

# Exploration Plan
# Mississippi Canyon Block 562
# (OCS-G 19966)

# "Isabela 2"

**PUBLIC COPY**

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|---|---|---|---|---|
| | | | | |
| | | | | |
| 0 | 4/18/2018 | | Adalberto Garcia | Sharrell McKennie |
| **Rev** | **Date** | **Document Status** | **Custodian/Owner** | **Authority** |

## AMENDMENT RECORD

| Amendment Date | Revision Number | Amender Initials | Amendment |
|---|---|---|---|
| | | | |
| | | | |
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# 1 Plan Contents

## 1.1 Description of Activities

Under this revised Exploration Plan, BP Exploration & Production Inc. (BP) proposes to drill and complete one (1) well (MC562 002) at primary location 'B'. Surface and bottom hole locations will be in Mississippi Canyon Block 562. The plan also includes a mirror location to the 'B' well referred to as the 'B-1' well. This mirror location ('B-1') is included only for re-spud purposes and ultimately targets the same production horizon. It will encounter the same sands on the path to the targeted bottom-hole location as its respective 'B' well.

The initial Exploration Plan (N-8778) for Mississippi Canyon 562 was submitted by BP Exploration & Production Inc. (BP) in July 2006 and approved on August 18, 2006 with proposed well locations 'A', 'B', 'C', and 'D'. A revised Exploration Plan (R-4490) was subsequently submitted in January 2007 and approved on February 13, 2007 for change in rig type. Only well location 'A' was drilled and is currently producing as MC562 001.

OCS Plan Information Forms (Form BOEM-0137) are included in **Appendix A**.

## 1.2 Location

A map at a scale of 1-in = 2,000-feet on an 8.5-in X 11-in sheet of paper that depicts the surface locations and water depths of the proposed wells is included in **Appendix B**. A bathymetry plat is also included in **Appendix B**.

## 1.3 Safety and Pollution Prevention Features

Safety and pollution prevention features utilized during drilling operations will include the use of appropriately designed casing and cement programs; appropriate blowout preventers, diverters, and other associated well equipment, appropriate mud monitoring equipment and sufficient mud volumes for well control; and properly trained personnel as described in 30 CFR Part 250, Subparts C, D, E, F, G and O, 30 CFR Part 550, Subparts B and C, and as further described in Notices to Lessees (NTLs). Appropriate fire drills and abandon ship drills will be conducted, and navigational aids, lifesaving equipment, and all other shipboard safety equipment will be installed and maintained as mandated by the U.S. Coast Guard regulations contained in 33 CFR Part 144.

## 1.4 Storage Tanks and Production Vessels

Information regarding the storage tanks and production vessels located on the drilling rig and support vessels that will store oil, as defined at 30 CFR 254.6 are provided in the tables below. Only those tanks with a capacity of 25 barrels or more are included.

### 1.4.1 Storage Tanks DP Semisubmersible

| Type of Storage Tank | Type of Facility | Tank Capacity (bbls) | Number of Tanks | Total Capacity (bbls) | Fluid Gravity (API) |
|---|---|---|---|---|---|
| Fuel Oil | Semisubmersible | 4,324 avg. | 5 | 21,620 | 38 |
| Lube oil | Semisubmersible | 70 avg. | 5 | 350 | 22 |
| Lube oil | Semisubmersible | 28 avg. | 4 | 112 | 22 |
| Base oil | Semisubmersible | 4,722 | 1 | 4,722 | 39 |

### 1.4.2 Storage Tanks Support Vessels

| Type of Storage Tank | Type of Facility | Tank Capacity (bbls) | No. of Tanks | Total Capacity (bbls) | Fluid Gravity (API) |
|---|---|---|---|---|---|
| Fuel Oil | Supply Boat (Typical 280-feet) | 450 | 16 | 7,200 bbls dependent on other cargo carried | 31.14 |

## 1.5 Additional Measures

In addition to the safety, pollution prevention and early spill detection measures required by 30 CFR Part 250 and 550, BP will rely on its Operating Management System (OMS) to help deliver safe and reliable operations. OMS is a system of interdependent activities that drive how BP will actually perform work and comply with internal and external standards and regulations. Within OMS, BP has also implemented a Safety Environmental Management System (SEMS), which provides a systematic way to identify risks, potential impacts, and compliance requirements that need to be managed. BP has also presented to the BOEMRE a report entitled *Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned*. This document assesses the capabilities that are now available to respond to oil spills in the GoM.

# 2 General Information

## 2.1 Applications and Permits

The table below provides information on the filing or approval status of the individual and/or site-specific Federal, State and local application approvals or permits, which must be obtained to conduct the proposed activities.

| Application / Permit | Issuing Agency | Status |
|---|---|---|
| General NPDES Permit | EPA | Existing |
| Application for Permit to Drill | BSEE – New Orleans District | Pending Submittal |
| Emergency Evacuation Plan | USCG | Pending Submittal |

## 2.2 Drilling Fluids

A table providing information on the types (including chemical constituents) and amounts of the drilling fluids that are planned to be used to drill the proposed wells is included below:

**Drilling Fluids per Well (~120-Days)**

| Type of Drilling Fluid | Estimated Volume of Drilling Fluid to be Used Per Well |
|---|---|
| Water based (seawater, freshwater, barite) | 50,000 bbls |
| Oil based (diesel, mineral oil) | NA |
| Synthetic based (internal olefin, ester) | 40,000 bbls |

Note: The Water base calculations includes the option to respud the well. Water based volume given is twice the volume to drill up to the TD of 22-in casing. It includes the water base mud and seawater needed. Estimated volume is 25,000 bbls without respud.

## 2.3 New or Unusual Technology

Exploration activities in Mississippi Canyon Block 562 are evaluating the applicability of Managed Pressure Drilling (MPD) technology to mitigate non-productive events associated with pore pressure / fracture gradient (PPFG) uncertainty. A MPD overview is included in **Appendix K** of this Exploration Plan

## 2.4 Bonding Information

The bonding requirements for the activities proposed in this Exploration Plan are satisfied by an area-wide bond, furnished and maintained according to 30 CFR Part 556, Subpart I, and NTL No. 2015-N04, and to the extent under 30 CFR 556.901 and National NTL No.2016-N01.

## 2.5 Oil Spill Financial Responsibility (OSFR)

BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP according to 30 CFR Part 553, and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

## 2.6 Deepwater Well Control

BP (Operator No. 02481) has the financial capability to drill a relief well and conduct other emergency well control operations.

## 2.7 Blowout Scenario

### 2.7.1 Blowout Scenario

The blowout scenario assumes that the pipe has been tripped out of the hole when a problem with the wellhead connector develops, resulting in the removal of the BOP stack. Due to the loss of riser margin, the well flows unrestricted. Day 1 worst case discharge (WCD) at well location 'B' is 170,000 bopd, with the calculation support package for this rate attached as **Appendix F** in the Proprietary Information copies of this Exploration Plan. The maximum duration of the blowout is estimated at 91 days (see relief well timing below). The rate profile associated with the well blowout over this 91 day period (also included in **Appendix F** in the Proprietary Information copies of this Exploration Plan) results in a potential worst case spill volume estimated at 12.65 mmstbo.

### 2.7.2 The Potential for the Well to Bridge Over

While bridging is possible due to generally low formation strengths in the Gulf of Mexico, no bridging was assumed in the 'worst case scenario'. The open hole intervals experienced on each well have multiple formations open simultaneously. The modeling of the failure point of the weakest interval includes many variables, and using no bridging yields a maximum flow potential.

### 2.7.3 The Likelihood for Surface Intervention to Stop the Blowout

The likelihood for above-mudline intervention to stop a blowout is dependent on the failure mechanism. Depending on the circumstances, BP may address a failure of the BOP stack by repairing the control system via ROVs, replacing the BOPs, or adding a BOP on top of the current BOP stack. Failure of the wellhead or casing would be more difficult and require clear access to the well below the failure point in order to run drill pipe and/or tools in the well.

In addition to BP's internal well containment and emergency response planning, BP has contracted resources to assist in the event of a blowout. Further, BP is a member of the Marine Well Containment Company ("MWCC"), currently has access to MWCC's Interim Containment Response System ("ICRS"), and will have full access to MWCC's Expanded Containment Response System when it is available.

### 2.7.4 The Availability and Timing of a Rig to Drill a Relief Well

The table below lists the Mobile Offshore Drilling Units (MODU) that are capable of drilling a relief well. The estimated time to spud is 3 to 10 days, pending requirements to safely secure the current operations of the MODU, required material logistics, mobilization to location, and regulatory approvals. The possibility of drilling a relief well from a neighboring platform or land is not applicable to operations proposed in this Exploration Plan; there is existing infrastructure in the vicinity of Mississippi Canyon Block 562.

| Parameters | West Vela (Main Derrick) | West Auriga (Main Derrick) |
|---|---|---|
| **Proposed Utility in Response** | Relief Well / Wellbore Capping | Wellbore Capping / Relief Well |
| **Current Location** | GoM | GoM |
| **Contract Expire Date** | 11/30/2020 | 11/30/2020 |
| **Rated WD (ft)** | 10K | 10K |
| **Rated TD (ft)** | 37.5K | 37.5K |
| **Rated BOPs (psi)** | 15K | 15K |
| **Derrick Capacity** | 2.5MM | 2.5MM |
| **Moor Type** | DP | DP |
| **Relevant Drill Package Limitations** | SHDH4 Connector | SHDH4 connector |

The estimated time to drill a relief well is: 10 days to mobilize and spud, 46 days from spud to casing shoe above WCD zone, plus 35 days for ranging, intersection, and kill operation--for a total of 91 days.

### 2.7.5 Measures that Would Enhance the Ability to Prevent a Blowout

Measures employed to prevent a blowout include compliance with applicable regulations (30 CFR Parts 250 and 550) and current NTLs. Additional measures include the following:

1. Volume measurements relative to the well will be monitored at all times during all operations;
2. Flow checks before leaving bottom, after pulling into shoe, and before BHA enters stack.
3. BP representative shall observe well conditions prior to each trip and after well kills or testing;
4. BP representative shall be the only person authorized to initiate opening the well as part or at the conclusion of well control measures;
5. On rig JSA/contingency plan before running any non-shearable tools or pipe through the BOP stack; and
6. BP has a 24/7 monitoring center, Houston Monitoring Center (HMC), located at BP's Westlake Campus. Through continuous monitoring, onshore staff have the ability to communicate issues they observe on the well with the Wells Superintendent and Wells Engineer, as well as the rig. The rig team can then make corrective actions as necessary; and

In addition to the additional measures listed above, BP has adopted the following performance standards:

1. BP will use, and will require its contractors involved in drilling operations to use, subsea blowout preventers (BOPs) equipped with no fewer than two blind shear rams and a casing shear ram on all drilling rigs under contract to BP for deepwater service operating in dynamic position mode. With respect to moored drilling rigs under contract to BP for deepwater drilling service using subsea BOPs, the subsea BOP will be equipped with two shear rams, which will include at least one blind shear ram and either an additional blind shear ram or a casing shear ram.
2. Each time a subsea BOP from a moored or dynamically positioned drilling rig is brought to the surface and testing and maintenance on the BOP are conducted, BP will require that a third party verify that the testing and maintenance of the BOP were performed in accordance with manufacturer recommendations and API Std 53.
3. BP will require that lab testing of cement slurries for primary cementing of casing and exposed hydrocarbon-bearing zones relating to drilling operations of deepwater wells be conducted or witnessed by a BP engineer competent to evaluate such lab testing, or a competent third party independent of the cement provider. BP will provide lab results to the applicable BSEE field office within a reasonable period of time.

### 2.7.6 Measures that Would Reduce the Likelihood of a Blowout

Measures to reduce the likelihood of a blowout include compliance with applicable regulations (30 CFR Parts 250 and 550) and current NTLs. Additional measures:

1. Minimize any influx events to the wellbore by using the best pore pressure / fracture gradient predictions available, using down-hole tools when appropriate, such as PWD and/or LWD to monitor the wellbore and update pore pressure / fracture gradient predictions;
2. Management of change process is in place for all procedure changes;
3. A Well Control Response Guide is in place; and
4. With the integration of the HMC, BP has staff monitoring wells 24/7. Having a monitoring center away from the rig in a controlled environment gives BP the opportunity to evaluate data real time and communicate issues to the Wells Superintendent, Wells Engineer, as well as the rig.

### 2.7.7 Measures which Would Enhance the Ability to Conduct Early Intervention

Measures to enhance the ability to conduct early intervention in addition to the regulation and NTL requirements include:

1. Possible relief well locations have been identified and screened for general acceptability. In the event of a blow out or other event necessitating a relief well, data will be collected post-event to ensure that previously-identified relief well locations are still valid, or to assist in determining alternate relief well locations if required;
2. Wellhead equipment and sufficient casing is identified and available for a relief well;
3. A rig(s) is identified and available for a relief well;
4. A Well Control Response Guide is in place; and
5. An Incident Management System (IMS) is in place.

- The BP IMS is comprised of government-approved plans covering various scenarios; Incident Management Teams are trained annually in the Incident Command System, which is a part of the National Incident Management System; BP has access to response capability through various contractors and technical specialists; and to pre-designated facilities, where the teams can provide adequate oversight to the response.

#### 2.7.8 Other Measures

All proposed activities and facilities in this EP will be covered by the GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) on August 15, 2017, on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on September 7, 2017.

# 3 Geological and Geophysical Information

## 3.1 Geological Description

A discussion of the geological objectives, including a brief description of the hydrocarbon trapping elements, is included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

## 3.2 Structure Contour Maps

Current structure contour maps are included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

## 3.3 Interpreted 2-D and/or 3D Seismic Lines

Migrated and annotated 3-D seismic lines with depth scale within 152 meters (500 feet) of the proposed surface locations are enclosed with the site clearance letters included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

## 3.4 Geological Structure Cross-Section Maps

Interpreted geological structure cross-section maps are included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

## 3.5 Shallow Hazards Report

A regional shallow hazards report dated March 2005 entitled "3D Geohazard Assessment, Gulf of Mexico – Mississippi Canyon Blocks 338-342, 382-386, 426-431, 470-479, 517-523, 561-567, & 605-608, Na Kika Prospect 3D Geohazard Study" was prepared by Gardline Surveys, Inc., Project No. 6364.

Two Archaeological and Hazard site surveys have also been conducted across the area and are represented by the following two reports:

C&C Technologies Survey Services, Inc. (C&C), 2006, "Archaeological and Hazard Study, Isabela Prospect, Block 562 (OCS-G-19966) and Vicinity, Mississippi Canyon Area, Project No. 8851-061235, issued to BP America Inc., June 2006.

C&C Technologies Survey Services, Inc. (C&C), 2009, "Archaeological, Engineering and Hazard Study, Galapagos Development Survey, Proposed Isabela, Santiago, Santa Cruz Infield Flowline Routes, Block 562 (OCS-G-19966) to Block 474 (OCS-G-26259), Mississippi Canyon Area, Project No. 097364-097423, issued to BP America Inc., November 2009.

## 3.6 Shallow Hazards Assessments (Site Clearance Letters)

Shallow hazards assessment (site clearance letters) that evaluate the seafloor and subsurface geologic and manmade features and conditions, for the proposed surface locations in Mississippi Canyon Block 562, Locations B and B-1 (1 letter – location B-1 is for the respud location) is included in **Appendix C** of this Exploration Plan.

## 3.7 High Resolution Seismic Lines

Seismic sections through the proposed well locations are included in the shallow hazards assessments (site clearance letters) in **Appendix C** of this Exploration Plan.

## 3.8 Stratigraphic Column

A generalized biostratigraphic / lithostratigraphic column is included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

## 3.9 Time vs. Depth Information

Time vs. Depth information is included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

# 4 Hydrogen Sulfide ($H_2S$) Information

## 4.1 Concentration

Anticipated $H_2S$ concentration is 0 ppm, based on offset well data and producing fields in Mississippi Canyon. $H_2S$ is not expected to be encountered during the operations proposed herein.

## 4.2 Classification

Based on previous drilling, no $H_2S$ is known to occur in the project area. Correlative wells information is included in **Appendix C** of the Proprietary Information copy of the Exploration Plan. BP requests that BOEM confirm the "H2S absent" classification.

## 4.3 $H_2S$ Contingency Plan

No $H_2S$ is documented in the offset wells in and around the project area, nor in nearby producing fields. Expected temperatures are too low for two of four main sources of $H_2S$ (thermal cracking, thermochemical sulfate reduction), vertical migration distance prevents a third (direct charge), and inadequate sulfate is present for the fourth (bacteria sulfate reduction). Therefore, no further model reports are needed.

## 4.4 Modeling Report

No $H_2S$ is documented in the offset wells in and around the project area, nor in nearby producing fields. Expected temperatures are too low for two of four main sources of $H_2S$ (thermal cracking, thermochemical sulfate reduction), vertical migration distance prevents a third (direct charge), and inadequate sulfate is present for the fourth (bacterial sulfate reduction). Therefore, no further model reports are needed.

# 5 Biological, Physical, and Socioeconomic Information

## 5.1 Benthic Communities Report

The BOEM requires site-specific surveys and reviews for proposed bottom-disturbing actions in water depths greater than 300-m in order to judge the potential of the region for supporting high density chemosynthetic organisms. NTL No. 2009–G40 formalized the process. BP has conformed to this requirement, and has located wells to avoid potential sites for benthic communities during the activities described by this plan.

Mississippi Canyon Block 562 is located in water depths greater than 300-m; At these depths, the potential exists for chemosynthetic communities to be present. Shallow hazards assessments conducted for the project confirm that high density benthic communities are not found within the vicinity of the proposed wellbore. These reports are contained in **Appendix C**.

## 5.2 Biologically Sensitive Underwater Features and Areas

The proposed activities will be conducted in a water depth of approximately 6,436 ft BSS. Therefore, requirements of NTL 2009-G39 for biologically sensitive underwater features and areas such as Topographic Features, Live Bottom (low-relief), Live Bottom (Pinnacle Trend) features, and other potentially sensitive biological features when conducting OCS operations in water depths less than 300-m (984-ft) in the Gulf of Mexico do not apply to this plan.

All proposed bottom-disturbing activities in this EP will occur outside of the nearest Topographic Features, "No Activity Zones", Live Bottom (low Relief), and Live Bottom (Pinnacle Trend) Stipulation Blocks described in NTL 2009-G39 and shown on BOEMRE April 2011 Map: "Biologically Sensitive Areas (< 300-m)".

## 5.3 Remotely Operated Vehicle (ROV) Monitoring Survey Plan

No longer applicable. NTL 2008-G06 "Remotely Operated Vehicle Surveys in Deepwater" has expired.

## 5.4 Threatened or Endangered Species, Critical Habitat and Marine Mammal Information

All marine mammals are protected under the Marine Mammal Protection Act (MMPA) and some are also protected under the Endangered Species Act (ESA).

One cetacean, the sperm whale and one sirenian species listed under the Endangered Species Act (ESA), occur in the GoM (USDOI, BOEMRE Final S-EIS CPA 2012-058). The only endangered marine mammal likely to be present at or near the project area is the sperm whale (*Physeter macrocephalus*); the threatened West Indian Manatee (*Trichechus manatus)* is thought to be remotely located away from the project area. The oceanic whitetip shark (*Carcharhinus longimanus*) was listed as threatened under the ESA on 30 January 2018 (effective 30 March 2018) by NMFS (83 FR 4153) and may be found in the Gulf of Mexico.

According to the project specific EIA, excluding the three endangered/threatened species mentioned above, there are an additional 21 species of marine mammals that may be found in the Gulf of Mexico. This includes 1 species of mysticete whale, dwarf and pygmy sperm whales, 4 species of beaked whales, and 14 species of delphinid whales (dolphins). The most common non-endangered cetaceans in the deepwater environment are small odontocetes such as the pantropical spotted dolphin, spinner dolphin, and bottlenose dolphin.

Endangered or threatened species that may occur in the project area and/or along the northern Gulf Coast are listed below and taken from Table 7 of **Appendix I**.

Federally listed endangered and threatened species potentially occurring in the lease area and along the northern Gulf Coast.

| Species | Scientific Name | Status | Potential Presence | | Critical Habitat Designated in Gulf of Mexico |
|---|---|---|---|---|---|
| | | | Project area | Coastal | |
| **Marine Mammals** | | | | | |
| Bryde's whale | *Balaenoptera edeni*[a] | P | X | -- | None |
| Sperm whale | *Physeter macrocephalus* | E | X | -- | None |
| West Indian manatee | *Trichechus manatus*[b] | T | -- | X | Florida (Peninsular) |
| **Sea Turtles** | | | | | |
| Loggerhead turtle | *Caretta caretta* | T,E[c] | X | X | Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida; Sargassum habitat including most of the central & western Gulf of Mexico. |
| Green turtle | *Chelonia mydas* | T | X | X | None |
| Leatherback turtle | *Dermochelys coriacea* | E | X | X | None |
| Hawksbill turtle | *Eretmochelys imbricata* | E | X | X | None |
| Kemp's ridley turtle | *Lepidochelys kempii* | E | X | X | None |
| **Birds** | | | | | |
| Piping Plover | *Charadrius melodus* | T | -- | X | Coastal Texas, Louisiana, Mississippi, Alabama, and Florida |
| Whooping Crane | *Grus americana* | E | -- | X | Coastal Texas (Aransas National Wildlife Refuge) |
| **Fishes and Sharks** | | | | | |
| Oceanic whitetip shark | *Carcharhinus longimanus* | T | X | -- | None |
| Gulf Sturgeon | *Acipenser oxyrinchus desotoi* | T | -- | X | Coastal Louisiana, Mississippi, Alabama, and Florida |
| **Invertebrates** | | | | | |
| Elkhorn coral | *Acropora palmata* | T | -- | X | Florida Keys and the Dry Tortugas |
| Lobed star coral | *Orbicella annularis* | T | -- | X | None |
| Mountainous star coral | *Orbicella faveolata* | T | -- | X | None |
| Boulder star coral | *Orbicella franksi* | T | -- | X | None |
| **Terrestrial Mammals** | | | | | |
| Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew) | *Peromyscus polionotus* | E | -- | X | Alabama and Florida (Panhandle) beaches |

Source: Project Specific EIA prepared by CSA Ocean Sciences Inc. April 2018

E = endangered; P = Proposed; T = threatened; X = potentially present; -- = not present.

[a] Gulf of Mexico Bryde's whales are protected by the Marine Mammal Protection Act. There is currently a proposed rule to list this stock as 'endangered' under the Endangered Species Act.

[b] There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (*T. m. manatus*), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico. On 30 March 2-17, the USFWS announced the West Indian manatee, including the Florida manatee subspecies, was reclassified as threatened.

[c] The loggerhead turtle is composed of nine distinct population segments (DPS). The only DPS that may occur in the project area (Northwest Atlantic DPS) is listed as threatened (76 *Federal Register* [FR] 58868; 22 September 2011).

Five species of sea turtle are known to inhabit the waters of the Gulf of Mexico:

- leatherback sea turtle (*Dermochelys coriacea*)
- green sea turtle (*Chelonia mydas*)
- hawksbill sea turtle (*Eretmochelys imbricata*)
- Kemp's ridley sea turtle (*Lepidochelys kempii*)
- loggerhead sea turtle (*Caretta caretta*)

According to the project specific EIA (Appendix I), Five species of endangered or threatened sea turtles may be found near the lease area. Endangered species include the leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) turtles. As of 6 May 2016, the entire North Atlantic DPS of the green turtle (*Chelonia mydas*) is listed as threatened (81 FR 20057). The DPS of loggerhead turtles (*Caretta caretta*) that occurs in the Gulf of Mexico is listed as threatened, although other DPSs are endangered.

Mississippi Canyon Block 562 falls outside Sargassum critical habitat designated for the loggerhead sea turtle. Additional information can be found in the Environmental Impact Analysis attached as **Appendix I.**

Two species of fish are the only listed threatened and endangered fish species in the Gulf of Mexico.

- Smalltooth Sawfish (*Pristis pectinata*)
- Gulf Sturgeon (subspecies *Acipenser oxyrinchus desotoi*)

The NMFS and United States Fish and Wildlife Service (USFWS) designated critical habitat for the Gulf sturgeon in fourteen geographic areas from Florida to Louisiana, encompassing spawning rivers and adjacent estuarine areas.

The smalltooth sawfish (*Pristis pectinata*) is remote from the project area and highly unlikely to be affected.

Two coastal species of birds that inhabit the GoM are protected under the ESA:

- Piping Plover (*Charadrius melodus*)
- Whooping Crane (*Grus americana*).

Critical overwintering habitat for the Piping plover has been designated in GoM, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida. Whooping crane critical habitat has been designated within the GoM region within the Aransas National Wildlife Refuge in Texas.

Four beach mice species occurring in the GoM are listed as endangered under the ESA and occupy restricted habitats in the mature coastal dunes of Florida and Alabama:

- Alabama beach mouse (*Peromyscus polionotus ammobates*)
- Choctawhatchee beach mouse (*Peromyscus polionotus allophrys*)
- St. Andrew beach mouse (*Peromyscus polionotus peninsularis*)
- Perdido Key Beach mouse (*Peromyscus polionotus trissyllepsis*)

The Florida salt marsh vole (Microtus pennsylvanicus dukecampbelli) is remote from the project area and highly unlikely to be affected.

There are currently six species of corals listed as threatened under the ESA in the Gulf of Mexico:

- elkhorn coral (*Acropora palmata*)
- staghorn coral (*Acropora cervicornis*)
- lobed star coral (*Orbicella annularis)*
- mountainous star coral (*Orbicella faveolata)*
- boulder star coral (*Orbicella franksi)*

The nearest critical habitat is for the elkorn coral has been designated in the Florida Keys.

According to the project specific EIA: "There are no other endangered animals or plants in the Gulf of Mexico that are reasonably likely to be adversely affected by either routine or accidental events."

## 5.5 Archaeological Report

Mississippi Canyon Area Block 562 has been designated to have an archaeological potential, as described in NTL 2011-JOINT-G01. Therefore, an Archaeological Report is required for activities proposed in this Exploration Plan. The following Archaeological surveys and assessments have been performed covering the majority of MC562 and the proposed well location as referenced under Section 3.5.

C&C Technologies Survey Services, Inc. (C&C), 2006, "Archaeological and Hazard Study, Isabela Prospect, Block 562 (OCS-G-19966) and Vicinity, Mississippi Canyon Area, Project No. 8851-061235, issued to BP America Inc., June 2006.

C&C Technologies Survey Services, Inc. (C&C), 2009, "Archaeological, Engineering and Hazard Study, Galapagos Development Survey, Proposed Isabela, Santiago, Santa Cruz Infield Flowline Routes, Block 562 (OCS-G-19966) to Block 474 (OCS-G-26259), Mississippi Canyon Area, Project No. 097364-097423, issued to BP America Inc., November 2009.

# 6 Waste and Discharge Information

## 6.1 Projected Generated Wastes

A table providing information on the projected solid and liquid wastes likely to be generated by the proposed activities is included in **Appendix D**.

## 6.2 Projected Ocean Discharges

A table providing information on the projected ocean discharges likely to be generated during the proposed activities is included in **Appendix D.**

# 7 Air Emissions Information

## 7.1 Screening Questions

| Screening Questions for EP's | Yes | No |
|---|---|---|
| Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formulas: $CT = 3400D^{2/3}$ for CO, and $CT = 33.3D$ for the other air pollutants (where D = distance to shore in miles)? | | X |
| Do your emission calculations include any emission reduction measures or modified emission factors? | X | |
| Are your proposed exploration activities located east of 87.5° W longitude? | | X |
| Do you expect to encounter $H_2S$ at concentrations greater than 20 parts per million (ppm)? | | X |
| Do you propose to flare or vent natural gas for more than 48 continuous hours, from any proposed well? | | X |
| Do you propose to burn produced hydrocarbon liquids? | | X |

## 7.2 Emissions Worksheet

An emission workbook (MMS-138) showing calculated emissions associated with the activities proposed in this Exploration Plan document is included in **Appendix E**. Complex total emissions are the same as plan emissions. Complex Total/Plan emissions are summarized in the Table below.

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL |
|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Mississippi Canyon | MC562 | OCS-G 19966 | Not Applicable | Well Locations B and B-1 |
| **Year** | **Emitted** | | | **Substance** | |
| | **PM** | **SOx** | **NOx** | **VOC** | **CO** |
| **2018** | **56.87** | **57.34** | **1512.74** | **59.55** | **381.35** |
| **2019** | **15.79** | **16.51** | **453.01** | **16.46** | **109.23** |
| **Allowable** | **2144.52** | **2144.52** | **2144.52** | **2144.52** | **54626.43** |

## 7.3 Emission Reduction Measures

| Emission Source | Reduction Control Method | Amount of Reduction (NOx) | Monitoring System |
|---|---|---|---|
| Seadrill West Capricorn MODU engines | Actual Fuel Usage* | 1328 TPY | MODU Fuel Usage Logs |

| | | | |
|---|---|---|---|
| Seadrill West Capricorn MODU Engines | International Air Pollution Prevention Certificate NOx Emission Factor | 525 TPY | Maintain copy of vessel International Air Pollutions Prevention Certificate |

*The Actual Fuel consumption for West Capricorn for 2013 – 2017 years is provided in **Appendix E**. The International Air Pollution Prevention Certificate for West Capricorn is provided in **Appendix E**.

## 7.4 Verification of Non-default Emission Factors

The BOEM 0138 "FACTOR" worksheet includes a maximum sulfur content of 0.1% versus default 0.4% in liquid fuel. The 0.1% sulfur was applied since this is the statutory limit assigned to marine vessels operating in Emission Control Areas (ECA) under Regulation 13 of MARPOL Annex VI (SOx emission control). Since this emission factor is more stringent than the default emission factor, no verification was required.

Additionally, the EMISSIONS1 worksheet tab utilizes the NOx emission factor for West Capricorn MODU engines that is specified in the vessel International Air Pollution Prevention certificate. The vessel International Air Pollution Prevention certificate is provided in **Appendix E**.

# 8 Oil Spill Information

## 8.1 Oil Spill Response Planning

### 8.1.1 Regional OSRP Information

All proposed activities and facilities in this EP will be covered by the GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) on August 15, 2017 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on September 7, 2017.

BP has adopted additional performance standards:

a. Provisions to maintain access to a supply of dispersant and fire boom for use in the event of an uncontrolled long-term blowout for the length of time required to drill a relief well;

b. Contingencies for maintaining an ongoing response for the length of time required to drill a relief well;

c. Description of measures and equipment necessary to maximize the effectiveness and efficiency of the response equipment used to recover the discharge on the water's surface, including methods to increase encounter rates;

d. Information regarding remote sensing technology and equipment to be used to track oil slicks, including oil spill detection systems and remote thickness detection systems (e.g., X-band/infrared systems);

e. Information regarding the use of communication systems between response vessels and spotter personnel;

f. Shoreline protection strategy that is consistent with applicable area contingency plans; and

g. For operations using a subsea BOP or a surface BOP on a floating facility, a discussion regarding strategies and plans related to source abatement and control for blowouts from drilling.

### 8.1.2 Spill Response Sites

| Primary Response Equipment Location | Preplanned Staging Location(s) |
|---|---|
| Pensacola, FL; Tampa, FL; Mobile, AL; Pascagoula, MS; Houma, LA.; Leeville, LA; Morgan City, LA; Lake Charles, LA.; Fort Jackson, LA; Venice, LA; Galveston, TX; Corpus Christi, TX; Ingleside, TX. | Fourchon, LA. |

### 8.1.3 OSRO Information

BP is a member of the Marine Spill Response Corporation (MSRC), Clean Gulf Associates (CGA) and the National Response Corporation and would utilize said Oil Spill Response Organization (OSRO) personnel and equipment in the event of an oil spill at Mississippi Canyon Area Block 562.

### 8.1.4 Worst-Case Scenario Determination

| Category | Regional OSRP Approved Sept. 7, 2017 | EP |
|---|---|---|
| Type of Activity | Drilling >10 miles | Drilling > 10 miles |
| Facility Location | MC 775 | MC 562 (SL) |
| Facility Designation | Thunder Horse Well 776 #6 | MODU |
| Distance to Nearest Shoreline | 66-miles | 64.4 -miles |
| Volume Storage tanks (total) | 0-bbls | 0-bbls |
| Volume Flowlines (on facility) | 0-bbls | 0-bbls |
| Volume Lease term pipelines | 5,000-bbls | 0-bbls |
| Volume Uncontrolled Blowout (Day 1) | 295,000-bbls | 170,000 -bbls |
| Total Volume | 300,000-bbls | 170,000 -bbls |
| Type of Oil(s) – (Crude Oil, Condensate, Diesel) | Crude | Crude |
| API Gravity(s) | 33.0 | 30.5 ° |

BP has determined that the worst case scenario from the activities proposed in this plan does not supersede the worst case scenario in BP's GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) approved on September 7, 2017. Pursuant to NTL No. 2008-G04, BP makes the following statement:

Since BP Exploration & Production Inc. has the capability to respond to the worst-case spill scenario included in its regional Oil Spill Response Plan approved on September 7, 2017, and since the worst-case scenario determined for our EP does not replace the worst-case scenario in our regional or sub-regional OSRP, BP certifies that it has the capability to respond, to the maximum extent practicable, to a worst-case discharge, or a substantial threat of such a discharge, resulting from the activities proposed in our EP.

Wellbore data, geologic data, reservoir data, and fluid data used in modeling and making the WCD determination for MC 562 002 at well location 'B' are provided in **Appendix F** in the Proprietary Information copies of this Exploration Plan. The drilling > 10 miles WCD scenario in the Regional OSRP is MC775 which was submitted to BOEM with Revised DOCD Control No. R-5494, and approved on September 12, 2012.

## 8.2 Oil Spill Response Discussion

A detailed discussion of a response to an oil spill at Mississippi Canyon Area Block 562 is included in **Appendix G.** This Appendix addresses topics such as resource identification, release modeling, response technologies, and source containment / control.

# 9 Environmental Monitoring and Mitigation Measures

## 9.1 Monitoring Systems

Operational personnel have been instructed to check for pollution frequently during their tour of duty and, in the event pollution is spotted, to identify and shut-off the source and make immediate notifications as per instructions provided in Section 8 of BP's certified OSRP.

In accordance with the provisions of Title 30 CFR § 250.417(e) and NTL 2009-G02 "Deepwater Ocean Current Monitoring on Floating Facilities" dated January 27, 2009, the MODU will be equipped with an Acoustic Doppler Current Profile (ADCP) current monitoring system onboard to allow continuous monitoring and gathering of ocean current data on a real-time basis in the upper 1000 meters.

## 9.2 Incidental Takes

To mitigate against incidental takes, activities will be conducted in adherence to BSEE NTL 2015-G03 "Marine Trash and Debris Awareness Training and Elimination"; BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and BOEM NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program". As required by BSEE NTL 2015-G03, BP submits an annual certification letter for its Marine Debris Awareness Training Process. The marine debris awareness training is required annually by the BSEE and is identified by "BP's Gulf of Mexico (GoM) Environmental Training Matrix" and "BP's GoM Health, Safety, and Environmental (HSE) Training Needs Assessment", both of which are located on BP's GoM HSE website. Monitoring activities are conducted by personnel on vessels to prevent accidental loss of materials overboard, and to report sightings of injured/dead protected species. Reporting of dead/injured protected species is addressed in Annex 2 of BP's "Incident Notification and Investigation Procedure - Attachment 1".

## 9.3 Flower Garden Banks National Marine Sanctuary

All proposed activities will occur outside of the Protective Zones of the Flower Garden Banks and Stetson Bank.

# 10 Lease Stipulations

Oil and gas exploration activities on the OCS are sometimes subject to mitigations in the form of lease stipulations.

## 10.1 Lease Stipulation Information

Lease Stipulation for Protected Species

All activities will be conducted in adherence to NTL 2015-G03 "Marine Trash and Debris Awareness Training and Elimination"; BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and BOEM NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program". Mitigation to prevent takes varies based on the activity underway and it can include worker training on waste management and trash and debris containment procedures to avoid accidental loss overboard and its potential impact on protected species, and training on reporting of dead/injured protected species addressed in BP's Incident Notification and Investigation Procedure.

## 11 Related Facilities and Operations Information

### 11.1 Produced Liquid Hydrocarbons Transportation Vessels

There are no well tests proposed in this Exploration Plan.

## 12 Support Vessels and Aircraft Information

### 12.1 General

| Type | Maximum Fuel Tank Storage Capacity | Maximum No. in Area at Any Time | Trip Frequency or Duration |
|---|---|---|---|
| Helicopter | 760-gals | 1 | 7 / week |
| Crew Boats | 1,000-bbls | 1 | 2 / week |
| Supply Boats | 5,000-bbls | 1 | 4 / week |

### 12.2 Diesel Oil Supply Vessels

| Size of Fuel Supply Vessel | Capacity of Fuel Supply Vessel | Frequency of Fuel Transfers | Route Fuel Supply Vessel will Take |
|---|---|---|---|
| 240-feet to 280-feet | 50,000-gallons (boat fuel)<br>150-K to 250-K gallons of transferable fuel (rig fuel) | Weekly / as needed | From the shorebase in Fourchon, LA, to Mississippi Canyon Area Block 562 |

### 12.3 Solid and Liquid Wastes Transportation & Disposal

A table providing information on the transportation of solid and liquid wastes and the onshore facilities used for disposal of solid and liquid wastes generated by the proposed activities is included in Table 2 found in **Appendix D**.

### 12.4 Vicinity Map

A vicinity map depicting the location of the proposed activities relative to the shoreline, the distance of the proposed activities from the shoreline, and the primary route(s) of the support vessels and aircraft when traveling between the onshore support facilities and the project areas is included in **Appendix B.**

# 13 Onshore Support Facilities Information

## 13.1 General

The onshore support base for the proposed operations will be in Fourchon, Louisiana. Mississippi Canyon Area Block 562 is located approximately 125.0 statute miles from the onshore support base located in Fourchon, Louisiana, as indicated on the vicinity map in **Appendix B.**

The following table provides information of the onshore facility that will be used to provide supply and service support for the activities proposed in this plan.

| Name | Location | Existing / New / Modified |
|---|---|---|
| C-Port | Fourchon, LA | Existing |
| Heliport | Houma, LA | Existing |

BP will primarily use the existing C-Port Fourchon Shorebase located in Fourchon, Terrebonne Parish, Louisiana to support general vessel operations. No expansion of these physical facilities is expected to result from the proposed revised activities. The C-Port Fourchon facility is located approximately 125.0 miles from the general activity area, provides a vehicle parking lot, office space, radio communication equipment, outside and warehouse storage space, crane, forklifts, water and fueling facilities, and boat dock space. The base is in operation 24-hours each day. Helicopters will be based out of Houma, Louisiana.

A small amount of vessel and helicopter traffic may originate from bases other than those described above in order to address changes in weather conditions. It is expected that this vessel traffic will originate from bases and locations that are in the near vicinity of the bases previously described.

## 13.2 Support Base Construction or Expansion

BP will utilize existing support bases for the proposed activities and will not require the construction or expansion of additional support bases.

## 13.3 Waste Disposal

Information about the onshore facilities used to store and dispose of solid and liquid wastes generated by proposed activities has been included in Table 2 found in **Appendix D**.

# 14 Coastal Zone Management Act (CZMA) Information

## 14.1 Consistency Certification

A Coastal Zone Management Act consistency certification, according to 15 CFR § 930.76(b) and (c), for the states of Louisiana and Alabama is included in **Appendix H**.

# 15 Environmental Impact Analysis (EIA)

Attached as **Appendix I** is an Environmental Impact Analysis (EIA) prepared for the proposed project by CSA Ocean Sciences Inc. 8502 SW Kansas Ave, Stuart, FL 34997.

BOEM (and its predecessor, the Minerals Management Service) have conducted extensive environmental analyses examining the possible impacts produced by oil and gas exploration and production activities, which evaluated impacts from similar activities on the areas in the Gulf of Mexico covered by the present plan.

The EIA addresses potential impacts to environmental resources found in the deepwater Gulf of Mexico (GoM), coastal habitats, protected areas, and onshore. Based on the activity set of the project, these included:

- Drilling rig presence, physical disturbance to the seafloor, air emissions, effluent discharges, water intake, onshore waste disposal, marine debris, support vessel/helicopter traffic, and unintended releases to the marine environment.

The EIA lists mitigation measures that will be in place to reduce associated risks.

# 16 Administrative Information

## 16.1 Exempted Information Description

In accordance with 43 CFR Part 2, Appendix E, sections (4) and (9), the following information has been determined by the BOEM GOMR exempt from public disclosure:

- Geologic Objectives (BHL, TVD and MD) on Form BOEM-0137
- Production rates and life of reservoirs
- Proprietary New or Unusual Technology
- Geological and Geophysical Information (except for non-proprietary Shallow Hazard Assessment)
- Hydrogen Sulfide Correlative Well Information

This information is excluded from the "Public Information" copies of the submitted plan.

## 16.2 Bibliography

Any previously submitted EP, DPP, DOCD, study report, survey report, or any other material referenced in this EP are listed below:

| Plan Control No | Lease | Block | Operator Name | Operator Number | Plan Type Code | Received Date | Final Action Code | Final Action Date |
|---|---|---|---|---|---|---|---|---|
| R-5061 | G19966 | MC 562 | BP Exploration & Production Inc | 02481 | DOCD | 8/18/2010 | 10/17/2011 | X |
| N-9461 | G19966 | MC 562 | BP Exploration & Production Inc. | 02481 | DOCD | 11/9/2009 | 3/26/2010 | A |
| R-4490 | G19966 | MC 562 | BP Exploration & Production Inc. | 02481 | EP | 1/30/2007 | 2/13/2007 | A |
| N-8778 | G19966 | MC 562 | BP Exploration & Production Inc. | 02481 | EP | 7/6/2006 | 8/18/2006 | C |

## 16.3 Other Reference Items


*Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned.*

Bureau of Ocean Energy Management (BOEM). 2012. Gulf of Mexico OCS Oil and Gas Lease Sale: 2012. Central Planning Area Lease Sale 216/222. Final Supplemental Environmental Impact Statement. OCS EIS/EA BOEM 2012-058. 2 vols.

BP America Inc, (BP), 2018, Site Clearance Letters, Proposed Well Location MC 562 “B” and “B-1” Block 562 OCS-G-19966 Mississippi Canyon Area, Gulf of Mexico, USA

Gardline Surveys, Inc., Project No. 6364, March 2005, 3D Geohazard Assessment, Gulf of Mexico – Mississippi Canyon Blocks 338-342, 382-386, 426-431, 470-479, 517-523, 561-567, & 605-608, Na Kika Prospect 3D Geohazard Study

C&C Technologies Survey Services, Inc. (C&C), 2006, “Archaeological and Hazard Study, Isabela Prospect, Block 562 (OCS-G-19966) and Vicinity, Mississippi Canyon Area, Project No. 8851-061235, issued to BP America Inc., June 2006.

C&C Technologies Survey Services, Inc. (C&C), 2009, “Archaeological, Engineering and Hazard Study, Galapagos Development Survey, Proposed Isabela, Santiago, Santa Cruz Infield Flowline Routes, Block 562 (OCS-G-19966) to Block 474 (OCS-G-26259), Mississippi Canyon Area, Project No. 097364-097423, issued to BP America Inc., November 2009.

Environmental Impact Analysis for a Revised Exploration Plan for Mississippi Canyon Block 562, CSA Ocean Sciences Inc. April 2018.

## 16.4 Gulf of Mexico Recovery Fees

**Appendix J** contains a copy of the receipt showing the payment of $3,673.00 for the service processing fee required by 30 CFR § 250.125, based on having two proposed surface locations (one (1) primary with one (1) alternate for re-spud purposes) within the limits set by NTL No. 2009-G27 (500 feet for water depths of 400 meters (1,312 feet) or greater) at Mississippi Canyon Area Block 562.

## 17 Appendixes

| | |
|---|---|
| Appendix A: | Plan Information Forms – Form BOEM-0137 |
| Appendix B: | Location Plat, Bathymetry Plat, and Vicinity Plat |
| Appendix C: | Geological & Geophysical Information (Geological Description, Structure Contour Maps, Interpreted Seismic Lines, Geological Structure Cross-Section Maps, Shallow Hazards Assessments (Site Clearance Letters), Stratigraphic Column, Hydrogen Sulfide Basis of Requested Classification, Time vs. Depth Information |
| Appendix D: | Wastes and Discharges Tables (Projected Generated Wastes and Projected Ocean Discharges) |
| Appendix E: | Air Emissions Information – Form BOEM-0138 |
| Appendix F: | WCD Modeling Report |
| Appendix G: | Oil Spill Response Discussion |
| Appendix H: | Coastal Zone Management Act (CZMA) Consistency Certification |
| Appendix I: | Environmental Impact Analysis (EIA) |
| Appendix J: | Fee Recovery |
| Appendix K: | New Technology |

# Appendix A: Plan Information Forms – Form BOEM-0137

# OCS PLAN INFORMATION FORM – Public Copy

## General Information

| | | | | |
|---|---|---|---|---|
| Type of OCS Plan: | X | Exploration Plan (EP) | Development Operations Coordination Document (DOCD) | |

| | |
|---|---|
| Company Name: BP Exploration & Production Inc. | BOEM Operator Number: 02481 |
| Address: 501 Westlake Park Blvd | Contact Person: Adalberto Garcia |
| Houston, TX 77079 | Phone Number: 281-995-2815 |
| | E-Mail Address: Adalberto.Garcia@bp.com |

| | | | | |
|---|---|---|---|---|
| If a service fee is required under 30 CFR 550.125(a), provide the | Amount paid | $3,673.00 | Receipt No. | 75468587833 |

## Project and Worst Case Discharge (WCD) Information

| | | | |
|---|---|---|---|
| Lease(s): OCS-G 19966 | Area: MC | Block(s): 562 | Project Name (If Applicable): Isabela 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Objective(s) | X | Oil | | Gas | | Sulphur | | Salt | Onshore Support Base(s): Fourchon, LA |

| | | |
|---|---|---|
| Platform/Well Name: MC562 002 | Total Volume of WCD: 12.65 MMSTBO | API Gravity: 30.5° |
| Distance to Closest Land (Miles): 64.4 statute miles | Volume from uncontrolled blowout: 170,000 STBO/day | |

| | | | | |
|---|---|---|---|---|
| Have you previously provided information to verify the calculations and assumptions for your WCD? | | Yes | X | No |
| If so, provide the Control Number of the EP or DOCD with which this information was provided | | | | |
| Do you propose to use new or unusual technology to conduct your activities? | X | Yes | | No |
| Do you propose to use a vessel with anchors to install or modify a structure? | | Yes | X | No |
| Do you propose any facility that will serve as a host facility for deepwater subsea development? | | Yes | X | No |

## Description of Proposed Activities and Tentative Schedule (Mark all that apply)

| Proposed Activity | Start Date | End Date | No. of Days |
|---|---|---|---|
| Drill and Complete Well MC562 002 (Loc. B or B-1) | 08/01/2018 | 01/31/2019 | 184 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## Description of Drilling Rig

| | | | |
|---|---|---|---|
| | Jackup | | Drillship |
| | Gorilla Jackup | | Platform rig |
| | Semisubmersible | | Submersible |
| X | DP Semisubmersible | | Other (Attach Description) |
| Drilling Rig Name (If Known): | | | |

## Description of Structure

| | | | |
|---|---|---|---|
| | Caisson | | Tension leg platform |
| | Fixed platform | | Compliant tower |
| | Spar | | Guyed tower |
| | Floating production system | | Other (Attach Description) |

## Description of Lease Term Pipelines

| From (Facility/Area/Block) | To (Facility/Area/Block) | Diameter (Inches) | Length (Feet) |
|---|---|---|---|
| | | | |
| | | | |

## OCS PLAN INFORMATION FORM (CONTINUED)
**Include one copy of this page for each proposed well/structure**

<table>
<tr><th colspan="8">Proposed Well/Structure Location</th></tr>
<tr><td colspan="3">Well or Structure Name/Number (If renaming well or structure, reference previous name):MC562 002 (Loc. B)</td><td colspan="2">Previously reviewed under an approved EP or DOCD? N-8778 / R-4490</td><td>X Yes</td><td colspan="2">No</td></tr>
<tr><td colspan="2">Is this an existing well or structure?</td><td>Yes</td><td>X No</td><td>If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="3"></td></tr>
<tr><td colspan="5">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X Yes</td><td colspan="2">No</td></tr>
<tr><td>WCD info</td><td colspan="2">For wells, volume of uncontrolled blowout (Bbls/day): 170,000</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls): N/A</td><td>API Gravity of fluid</td><td colspan="2">30.5°</td></tr>
<tr><td></td><td colspan="2">Surface Location</td><td colspan="2">Bottom-Hole Location (For Wells)</td><td colspan="3">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td colspan="2">OCS-G 19966</td><td colspan="2">OCS-G</td><td colspan="3">OCS<br>OCS</td></tr>
<tr><td>Area Name</td><td colspan="2">Mississippi Canyon</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td>Block No.</td><td colspan="2">562</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td colspan="2">N/S Departure:<br>3,419.00 FNL</td><td colspan="2">N/S Departure:</td><td colspan="3">N/S Departure: F____L<br>N/S Departure: F____L<br>N/S Departure: F____L</td></tr>
<tr><td colspan="2">E/W Departure:<br>5,306.00 FEL</td><td colspan="2">E/W Departure:</td><td colspan="3">E/W Departure: F____L<br>E/W Departure: F____L<br>E/W Departure: F____L</td></tr>
<tr><td rowspan="2">Lambert X-Y coordinates</td><td colspan="2">X:<br>1,230,214.00’</td><td colspan="2">X:</td><td colspan="3">X:<br>X:<br>X:</td></tr>
<tr><td colspan="2">Y:<br>10,324,261.00’</td><td colspan="2">Y:</td><td colspan="3">Y:<br>Y:<br>Y:</td></tr>
<tr><td rowspan="2">Latitude/ Longitude</td><td colspan="2">Latitude<br>28° 26’ 37.195” N</td><td colspan="2">Latitude</td><td colspan="3">Latitude<br>Latitude<br>Latitude</td></tr>
<tr><td colspan="2">Longitude<br>88° 16’ 36.540” W</td><td colspan="2">Longitude</td><td colspan="3">Longitude<br>Longitude<br>Longitude</td></tr>
<tr><td colspan="3">Water Depth (Feet):<br>6,436</td><td>MD (Feet):</td><td>TVD (Feet):</td><td rowspan="2" colspan="2">MD (Feet):<br>MD (Feet):<br>MD (Feet):</td><td rowspan="2">TVD (Feet):<br>TVD (Feet):<br>TVD (Feet):</td></tr>
<tr><td colspan="3">Anchor Radius (if applicable) in feet:</td><td colspan="2">N/A</td></tr>
</table>

**Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)**

| Anchor Name or No. | Area | Block | X Coordinate | Y Coordinate | Length of Anchor Chain on Seafloor |
|---|---|---|---|---|---|
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |

## OCS PLAN INFORMATION FORM (CONTINUED)
**Include one copy of this page for each proposed well/structure**

### Proposed Well/Structure Location

| | | | | | | |
|---|---|---|---|---|---|---|
| Well or Structure Name/Number (If renaming well or structure, reference previous name):MC562 002 (Loc. B-1) | Previously reviewed under an approved EP or DOCD? | | Yes | X | No | |
| Is this an existing well or structure? | | Yes | X | No | If this is an existing well or structure, list the Complex ID or API No. | |
| Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities? | X | Yes | | No | | |

| | | | | |
|---|---|---|---|---|
| **WCD info** | For wells, volume of uncontrolled blowout (Bbls/day): 170,000 | For structures, volume of all storage and pipelines (Bbls): N/A | API Gravity of fluid | 30.5° |

| | **Surface Location** | **Bottom-Hole Location (For Wells)** | **Completion (For multiple completions, enter separate lines)** |
|---|---|---|---|
| **Lease No.** | OCS-G 19966 | OCS-G | OCS<br>OCS |
| **Area Name** | Mississippi Canyon | | |
| **Block No.** | 562 | | |
| **Blockline Departures (in feet)** | N/S Departure:<br>3,441.00 FNL | N/S Departure: | N/S Departure: F____L<br>N/S Departure: F____L<br>N/S Departure: F____L |
| | E/W Departure:<br>5,273.00 FEL | E/W Departure: | E/W Departure: F____L<br>E/W Departure: F____L<br>E/W Departure: F____L |
| **Lambert X-Y coordinates** | X:<br>1,230,247.00’ | X: | X:<br>X:<br>X: |
| | Y:<br>10,324,239.00’ | Y: | Y:<br>Y:<br>Y: |
| **Latitude/ Longitude** | Latitude<br>28° 26’ 36.980” N | Latitude | Latitude<br>Latitude<br>Latitude |
| | Longitude<br>88° 16’ 36.168” W | Longitude | Longitude<br>Longitude<br>Longitude |

| | | | | |
|---|---|---|---|---|
| Water Depth (Feet):<br>6,436 | MD (Feet): | TVD (Feet): | MD (Feet):<br>MD (Feet):<br>MD (Feet): | TVD (Feet):<br>TVD (Feet):<br>TVD (Feet): |
| Anchor Radius (if applicable) in feet: | N/A | | | |

### Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

| **Anchor Name or No.** | **Area** | **Block** | **X Coordinate** | **Y Coordinate** | **Length of Anchor Chain on Seafloor** |
|---|---|---|---|---|---|
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |
| | | | X = | Y = | |

OCS PLAN INFORMATION FORM (CONTINUED)

**Provide the following information for the well with the highest Worst Case Discharge volume:**

| Worst Case Discharge (WCD) Well Information | | | | | | | |
|---|---|---|---|---|---|---|---|
| **WCD Well Name** | **Surface Lease** | **Surface Area/Block** | **Bottom Lease** | **Bottom Area/Block** | **Product Type** | **MD** | **TVD** |
| MC562 002 ('B') | OCS-G 19966 | MC562 | | | | | |

| Analog Well(s) | | | |
|---|---|---|---|
| **Area/Block** | **OCS Lease** | **Well No.** | **API No.** |
| | | | |
| | | | |
| | | | |
| | | | |

## Geologic Data for WCD

| Open Hole Interval for WCD | |
|---|---|
| **Top (TVD in feet)** | **Base (TVD in feet)** |
| | |
| | |

| | Sand 1 | Sand 2 | Sand 3 | Sand 4 | Sand 5 |
|---|---|---|---|---|---|
| **Formation Data** | | | | | |
| Sand Name | | | | | |
| Estimated Top TVD | | | | | |
| Estimated Base TVD | | | | | |
| Estimated Net Sand Height MD (Net Pay if hydrocarbon) | | | | | |
| Estimated Net Sand Height TVT (Net Pay if hydrocarbon) | | | | | |
| Fluid Type | | | | | |
| Used in WCD? (Yes/No) | | | | | |

| Seismic Survey Used | |
|---|---|
| | |
| | |
| | |

## Engineering Data for WCD

| WCD Engineering Items | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WCD (STB/Day) | | | | | | | | | | | | |
| WCD Calculated at | Mudline | | Yes | | No | | Atmosphere | | Yes | | No | |
| Flow Correlation | | | | | | | | | | | | |
| Outlet Pressure (Psia) | | | | | | | | | | | | |
| Gas Turbulence Factor | | | | | | | | | | | | |
| Software Model Used | | | | | | | | | | | | |

| | Sand 1 | Sand 2 | Sand 3 | Sand 4 | Sand 5 |
|---|---|---|---|---|---|
| **Formation Data** | | | | | |
| Sand Name | | | | | |
| Permeability (mD) | | | | | |
| Initial Pressure (PSIA) | | | | | |

OCS PLAN INFORMATION FORM (CONTINUED)

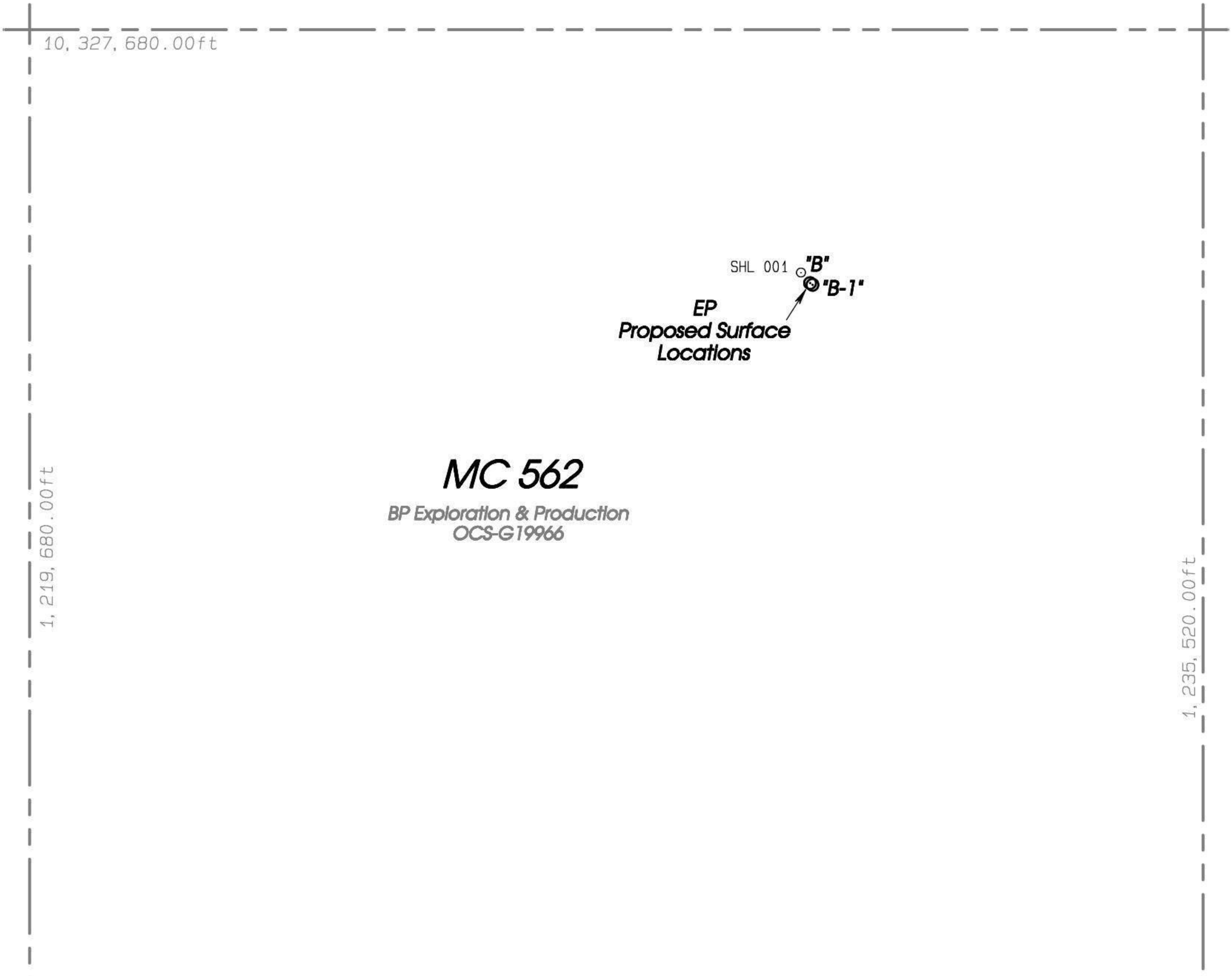
| | Sand 1 | Sand 2 | Sand 3 | Sand 4 | Sand 5 |
|---|---|---|---|---|---|
| **Formation Data** | | | | | |
| Reservoir Temperature (F) | | | | | |
| Porosity (0.00) | | | | | |
| Water Saturation (0.00) | | | | | |
| Rock Compressibility (microsips) | | | | | |
| Water Salinity (ppm) | | | | | |
| Drive Mechanism | | | | | |
| Drainage Area (acres) | | | | | |
| **Oil Reservoir Data** | | | | | |
| Bubble Point Pressure (PSIA) | | | | | |
| Initial Bo (RB/STB) | | | | | |
| Bo (RB/STB) @ Bubble Point | | | | | |
| Rsi (SCF/STB) | | | | | |
| Initial Oil Viscosity (Cp) | | | | | |
| Oil Viscosity (CP) @ Bubble Point | | | | | |
| Oil Compressibility (1/PSIA) | | | | | |
| Oil API Gravity (API) | | | | | |
| Specific Gas Gravity (0.00) | | | | | |
| **Gas Reservoir Data** | | | | | |
| Condensate API Gravity (API) | | | | | |
| Specific Gas Gravity (0.00) | | | | | |
| Yield (STB/MMCF) | | | | | |

| **Source of Permeability Used** | | | |
|---|---|---|---|
| Permeability from MDT | | | |
| Permeability from Core Analysis | Percussion core | Rotary sidewall core | Conventional core |
| Pressure Transient Analysis | | | |
| Permeability from CMR or NMR log analysis | | | |
| Permeability from other source | | | |

| **Provide Model Input Values for Relative Permeability:** | |
|---|---|
| Residual Oil to Gas fraction (=1-Slc-Swc) | |
| Residual Oil to Water fraction (=Soc) | |
| Critical Gas fraction (Sgc, Gas/Oil-Water Systems) | |
| Residual Gas to Water fraction (Sgc, Gas/Gas-Water Systems) | |
| Kro Oil Curve Endpoint (fraction of absolute permeability) | |
| Krg Gas Curve Endpoint (fraction of absolute permeability) | |
| Krw Water Curve Endpoint (fraction of absolute permeability) | |

**Paperwork Reduction Act of 1995 Statement:** The Paperwork Reduction Act of 1995 (44 U.S.C. 2501 et seq.) requires us to inform you that BOEM collects this information as part of an applicant's Exploration Plan or Development Operations Coordination Document submitted for BOEM approval. We use the information to facilitate our review and data entry for OCS plans. We will protect proprietary data according to the Freedom of Information Act and 30 CFR 550.197. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget Control Number. Responses are mandatory (43 U.S.C. 1334). The public reporting burden for this form is included in the burden for preparing Exploration Plans and Development Operations Coordination Documents. We estimate that burden to average 600 hours with an accompanying EP, or 700 hours with an accompanying DPP or DOCD, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms associated with subpart B. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Bureau of Ocean Energy Management, 45600 Woodland Road, Sterling, Virginia 20166.

## Appendix B: Location Plat, Bathymetry Plat, and Vicinity Plat




## EP Proposed Surface Hole Locations:

| PSHL | MC562 BLOCK TIES FNL | MC562 BLOCK TIES FEL | UTM Zone 16 North NAD27 - US Survey Feet Northing (Y) | UTM Zone 16 North NAD27 - US Survey Feet Easting (X) | NAD27 Lat/Long Latitude (N) | NAD27 Lat/Long Longitude (W) | NAD83 Lat/Long Latitude (N) | NAD83 Lat/Long Longitude (W) | Water Depth MSL (feet) |
|---|---|---|---|---|---|---|---|---|---|
| B | 3419.00 | 5306.00 | 10324261.00 | 1230214.00 | 28°26'37.195" | 88°16'36.540" | 28°26'38.080" | 88°16'36.530" | 6436 |
| B-1 | 3441.00 | 5273.00 | 10324239.00 | 1230247.00 | 28°26'36.980" | 88°16'36.168" | 28°26'37.865" | 88°16'36.158" | 6436 |

10,311,840.00ft

Notes:
1) All spatial ldata based on UTM Zone 16 North, NAD27, US Survey Feet, unless otherwise noted;
2) All geodetic transformations by NADCON 2.0, or better equivalent software;
3) This operation is not within a Military Warning Area;
4) This operation is within BSEE New Orleans District;
5) Water Depths are approximate and are based on GEMS 3D Seismic Derived bathymetry adjusted +13 feet to match as-drilled well depth @ MC562 No.1 of 6435ft.

Grid: UTM Zone 16 North
Datum: NAD27
Units: US Survey Feet

Grid North

"Public Information"

**BP EXPLORATION AND PRODUCTION**

**PROPOSED EP LOCATIONS OCS-G19966 MC562 "B" and "B-1"**

*Mississippi Canyon Area (OPD# NH16-10) Block 562* — *Federal Offshore*

Plat prepared by: Robert M. Frost, PLS, Reservoir Development

*Scale 1" = 2000 ft*

*Date: 13 March 2018*

*rmf*

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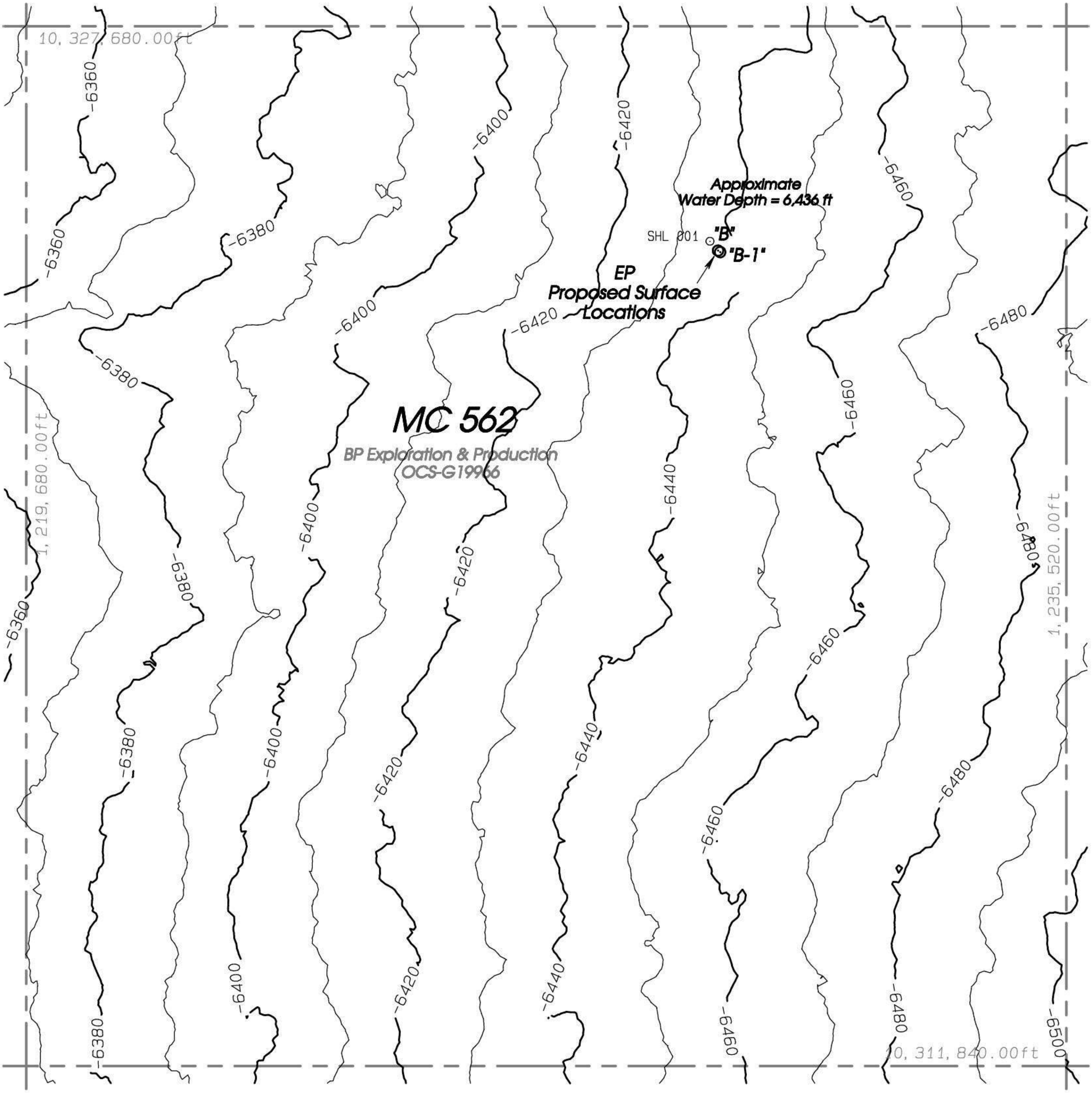


Notes:
1) All spatial ldata based on UTM Zone 16 North, NAD27, US Survey Feet, unless otherwise noted;
2) All geodetic transformations by NADCON 2.0, or better equivalent software;
3) This operation is not within a Military Warning Area;
4) This operation is within BSEE New Orleans District;
5) Water Depths are approximate and are based on GEMS 3D Seismic Derived bathymetry adjusted +13 feet to match as-drilled well depth @ MC562 No.1 of 6435ft.

**Bathymetry:**
GEMS 3D Seismic Derived Bathymetry
Adjusted +13 feet to match as-drilled well depth @ MC562 No.1 of 6435ft.
Contour Interval = 10 feet.

Grid: UTM Zone 16 North
Datum: NAD27
Units: US Survey Feet

Grid North

# "Bathymetry"

bp

BP EXPLORATION AND PRODUCTION

PROPOSED EP LOCATIONS OCS-G19966 MC562 "B" and "B-1"

Mississippi Canyon Area (OPD# NH16-10) Block 562 — Federal Offshore

Plat prepared by: Robert M. Frost, PLS, Reservoir Development

Scale 1" = 2000 ft

Date: 13 March 2018

rmf

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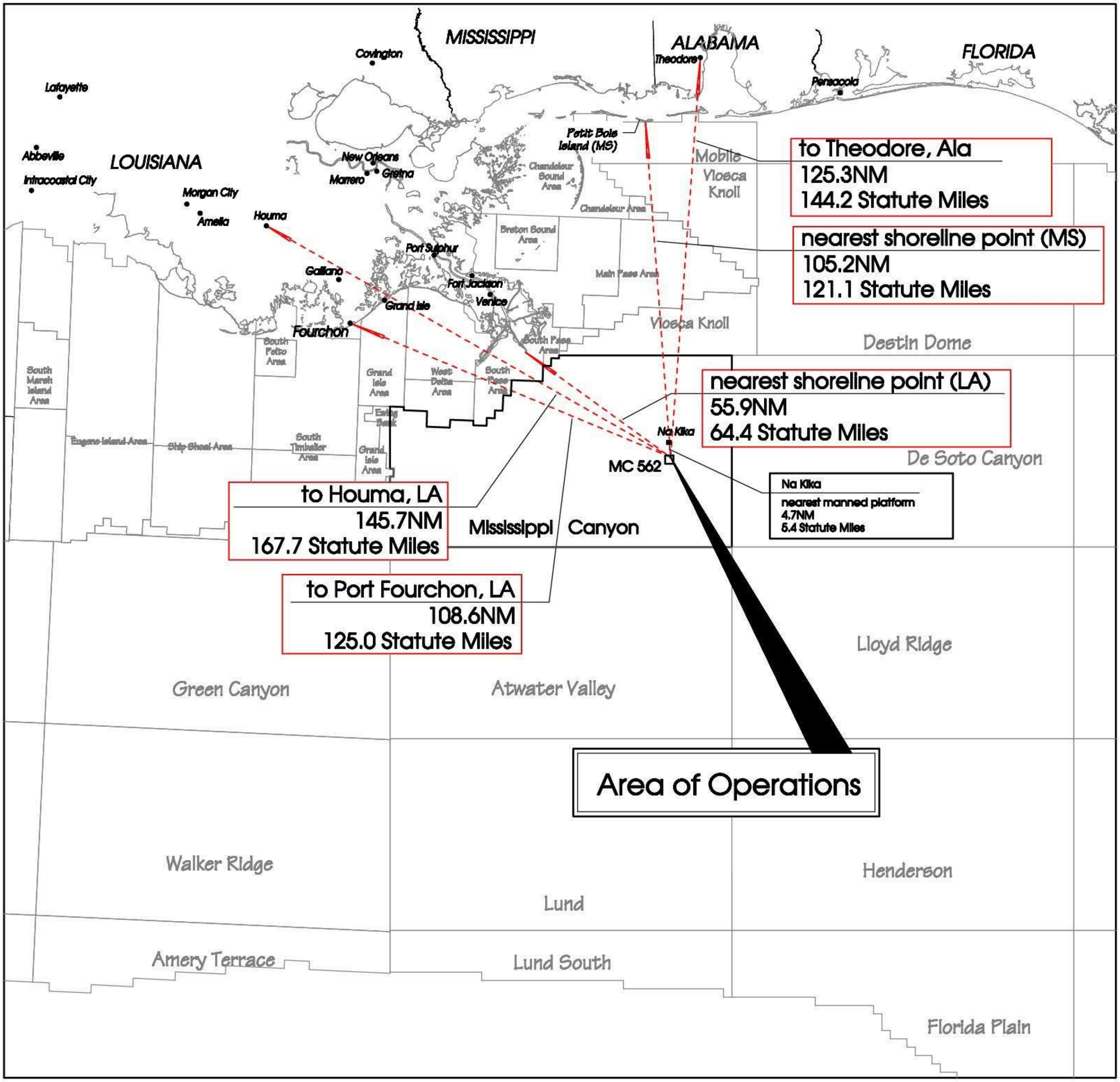


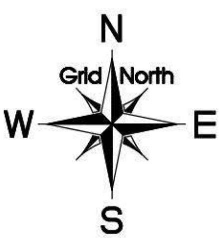


Grid: UTM Zone 16 North
Datum: NAD27
Units: US Survey Feet

# "VICINITY CHART"

| | | |
|---|---|---|
| bp | BP EXPLORATION AND PRODUCTION | Scale 1" = 50 miles |
| | Proposed EP Locations OCS-G19966 MC562 "B" and "B-1" | Date: 13 March 2018 |
| | *Mississippi Canyon Area (OPD# NH16-10) Block 562* — *Federal Offshore* | |
| | Plat prepared by: Robert M. Frost, PLS, BP Reservoir Development | rmf |

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## Appendix C: Geological & Geophysical Information (Geological Description, Structure Contour Maps, Interpreted Seismic Lines, Geological Structure Cross-Section Maps, Shallow Hazards Assessments (Site Clearance Letters) for Well Locations, Stratigraphic Column, $H_2S$ Correlative Wells Information, Time vs. Depth Information

# SITE CLEARANCE LETTER

# PROPOSED APPRAISAL WELL LOCATIONS
# MC 562 “B” AND MC 562 “B1”
# BLOCK 562, OCS-G-19966
# MISSISSIPPI CANYON AREA

| PROPOSED SURFACE LOCATION - MC 562 “B” | |
|---|---|
| 88° 16' 36.540" W | 28° 26' 37.195" N |
| X = 1,230,214 ft E | Y = 10,324,261 ft N |
| 3419 FNL | 5306 FEL |
| Water Depth: | 6,436 ft below MSL |

| PROPOSED SURFACE LOCATION – MC 562 “B1” | |
|---|---|
| 88° 16' 36.168" W | 28° 26' 36.980" N |
| X = 1,230,247 ft E | Y = 10,324,239 ft N |
| 3441 FNL | 5273 FEL |
| Water Depth: | 6,436 ft below MSL |

**X and Y Coordinates in UTM 16N (US Survey ft)**
**Geodetic Datum: NAD 1927**
**Spheroid: Clarke 1866**

# PROPOSED WELL LOCATION MC 562 "B" AND "B1"
# BLOCK 562, OCS-G-19966
# MISSISSIPPI CANYON AREA, GULF OF MEXICO, USA

**Introduction.** This wellsite clearance letter addresses the shallow hazards for proposed wellsites MC 562 "B" and MC 562 "B1" in Block 562, Mississippi Canyon, Gulf of Mexico (OCS-G-19966). This letter is intended to address specific seafloor and shallow geologic conditions within 2,000 ft of the proposed wellsite from the seafloor (6,436 ft True Vertical Depth Sub-Sea; TVDSS) to about 11,872 ft TVDSS based on reprocessed 3D seismic, autonomous underwater vehicle (AUV) data and limited offset well data. The MC 562 "B1" location is about 40 ft to the southeast from the MC 562 "B" location and is not described separately in this letter as shallow geologic conditions are expected to be very similar. BP plans to drill the proposed appraisal well from a dynamically positioned vessel, therefore, an anchoring assessment is not required.

This letter supplements the Exploration Plan (EP) to be submitted, and complies with Bureau of Ocean Energy Management (BOEM) guidelines provided in Notice to Lessees (NTL) 2014-G04, 2011-JOINT-G01, 2009-G40, 2008-G05, and 2005-G07 (BOEM, 2014, 2011, 2010, 2008 and 2005). This letter is supported by comprehensive Archaeological and Hazards assessments done by C&C Technologies Survey Services in 2006 and 2009, and a regional 3D seismic based Shallow Hazards study, across multiple blocks in the area, by Gardline Surveys, Inc. in 2005 (C&C, 2006 and 2009; Gardline 2005). The C&C reports are based on AUV site survey data acquired in 2006 and 2009. These reports were previously submitted along with the EP for several wells within the BP Nakika Field. The text, maps, and plates included in the C&C and Gardline reports provide detail on the regional geology of the Study Area. This letter is intended to supplement those reports with detailed site-specific interpretation conducted by BP at the proposed MC 562 "B" and "B1" wellsites using recently reprocessed seismic data.

**Attachments.** Seafloor plates (1, 2, 3, 4 and 5) are centered on the proposed exploration well MC 562 "B" and are displayed at a 1 inch = 1,000 ft scale (1:12,000). A 2,000-ft radius circle around the proposed wellsite is also shown on the Seafloor Plates.

- AUV Seafloor Rendering
- AUV Water Depth and Seafloor Features
- AUV Seafloor Gradient
- AUV Multibeam Echosounder (MBES) Backscatter Data
- AUV Side Scan Sonar (SSS) Mosaic

The sub-surface plates (6, 7, 8, 9, and 10) accompanying this letter were extracted from the AUV and 3D seismic data volumes and are listed below.

- Sub-Surface Geologic Features
- Portion of 2006 AUV Line Isabela 206.1.a.0.et.sub.part-02.sc
- Portion of 3D Seismic Line 1976
- Portion of 3D Seismic Crossline 8016
- Top-hole Prognosis Chart, Proposed Wellsite MC 562 "B" and "B1"

**3D Seismic Survey Parameters.** The reprocessed 3D depth volume used in this site-specific assessment covers an approximate 25 block area in the eastern Mississippi Canyon (MC) area. The survey was acquired using 6 streamers (648 channels per streamer) with a length of 8,100 m separated 100 m apart, a streamer depth of 9 m and 2 energy sources at a depth of 6 m. Survey Inlines are oriented northwest-southeast, have a numerical increment of one, and are spaced 41 ft (12.5 m) apart. Crosslines are oriented northeast-southwest, have a numerical increment of one, and are spaced 41 ft (12.5 m) apart.

Shallow Hazards NTL 2008-G05 addresses the data quality and frequency content required of 3D seismic data used for shallow hazards assessment. In compliance with this NTL, the original conventional 3D seismic dataset was reprocessed by CGG, Inc., in 2013, using Kirchhoff pre-stack depth migration (PSDM). The data have a loaded record length of approximately 32,500 ft and a sample rate of 10 ft. The seismic data follow North American polarity convention and demonstrate a balanced zero phase wavelet based on the seafloor reflector, and high amplitude, low-impedance anomalies indicative of shallow gas.

**3D Seismic Frequency.** The reprocessed 3D seismic data displays a bandwidth between about 5 - 72 Hz for the top-hole section. This frequency bandwidth corresponds to a limit of separability of about 32 ft, assuming a representative frequency of 43 Hz and an average velocity of 5,500 ft/sec in the shallow section.

**Autonomous Underwater Vehicle (AUV) Survey Data**. Multibeam Echosounder (MBES), Side Scan Sonar (SSS), and Subbottom Profiler Data (SBP), collected by means of an autonomous underwater vehicle (AUV) system by C&C Technologies Survey Services (C&C) in 2006 and 2009. The 2006 survey was acquired aboard the R/V Northern Resolution, between April 23$^{rd}$ and 28$^{th}$, 2006. The survey consists of fifty-four (54) north-south primary tracklines spaced 656 ft (200 m) apart and eleven (11) east-west tielines spaced 2953 ft (900 m) apart. The 2009 AUV site survey was acquired for infield development. For further details concerning the surveys, please refer to C&C 2006 & 2009 reports.

**Offset Well Data.** Offset well data from the BOEM database and BP internal notes were used to compile a summary of shallow hazards encountered at nearby offset wells. The closest offset well, MC 562-1, is shown on the 3D seismic Inline 1976 cross section relative to the proposed wellbore (Figure 8).

**Archaeological Resource Survey Requirement.** The study areas lies within an area designated as archeologically sensitive according to NTL No. 2005-G07 and NTL 2011-JOINT-G01 (BOEM, 2005 and 2011). In order to ensure that archaeological resources on the Outer Continental Shelf (OCS) are not damaged or destroyed by oil, gas, and sulphur operations, and pursuant to the Pre-Seabed Disturbance Survey Mitigation (BOEM, 2011), an archaeological assessment of the drilling location was performed. In April 2006, BP acquired an AUV archaeological survey throughout the study area. The goal of the survey was to allow maximum flexibility to move locations early in the well planning process if any archaeological artefacts were identified. C&C conducted the survey and generated an archaeological assessment report (C&C, 2006). In 2009 C&C conducted an infield AUV site survey for planned infield flowlines (C&C, 2009). There are no archaeologically significant artifacts identified within 2,000 ft of the proposed well location. The closest unidentified side scan sonar contacts to the proposed well location are about 1,165 ft northeast (Sonar contact #57) and 1,600 ft east-northeast (Sonar contact #116) and will not constrain appraisal drilling at MC 562 "B" and "B1" (Plates 2 and 5).

## SEAFLOOR CONDITIONS

**Water Depth and Seafloor Gradient**. The water depth at the proposed MC 562 "B" and "B1" locations is predicted to be about 6,436 ft. The depth was derived from AUV Multibeam Bathymetry data (Plates 1 and 2). The local seafloor gradient is about 1.3 degrees to the east-southeast (Plate 3).

**Seafloor Features.** The generally hummocky nature of the seafloor appears to be due to sediment drape over the margin of a shallow-buried mass transport deposit (Plates 1, 2, 3 and 7). Drill cuttings produced during the riserless drilling of the nearby MC 562-1 well extend across the area. The AUV side scan sonar and backscatter data (Plates 4 and 5) indicate the seafloor is likely comprised of soft, marine clays.

**Man-Made Obstructions.** The closest infrastructure to the proposed wellsite is the Santa Cruz infield oil flowline (Segment No. 16282) about 80 ft northwest, the Isabela Plem 2 about 90 ft northwest, the Isabela flowline jumper about 100 ft to the west, and the existing MC 562-1 wellhead about 190 ft to the northwest (Plate 1). The proposed MC 562 “B” well location does not lie within a Military Warning Area as defined by BOEM NTL 2014-G04 (BOEM, 2014) and is not located within a known chemical or munitions dump site. Thus, hazardous wastes or unexploded ordnance are not expected, and nothing resembling such was detected on AUV data in the vicinity of the proposed well locations.

**Seafloor Debris.** There are two pieces of seafloor debris identified on the AUV survey within 2,000 ft of the proposed well (Plates 2 and 5). The nearest piece of debris identified in the AUV data is about 1,165 ft northeast of the proposed well (Sonar contact #57), which displays length, width and height of 4.4 ft x 2.6 ft by 2.3 ft, respectively. The contact is interpreted as seafloor debris and will not constrain appraisal drilling at MC 562 “B” and “B1”.

**Potential High-Density Benthic Communities.** There is no geophysical evidence of seafloor hardgrounds or active hydrocarbon seepage features that could potentially support high-density benthic communities within 2,000 ft of the proposed location (Plates 1, 2, 4 and 5). This assessment is based primarily on the AUV multibeam bathymetry, backscatter, side-scan sonar and subbottom profiler data.

**SUBSURFACE CONDITIONS**

**Stratigraphy.** The stratigraphy of the top-hole section at the proposed MC 562 “B” and “B1” locations, as exhibited by the AUV sub-bottom profiler and reprocessed 3D seismic data, consists of approximately 5,436 ft of deep-water sediments between the seafloor and the depth limit of investigation (Plates 7, 8, 9, and 10). The age of the top-hole sediment packages extends from Pleistocene to Pliocene and Upper Miocene and is mostly comprised of fine-grained sediments, interbedded with some sand-prone channel/levee complexes. The sediments within the top-hole typically thicken to the east-southeast. The notional 36-inch, 28-inch and 22-inch casing shoes for the proposed well are shown on Plate 10.

The seafloor and ten subsurface horizons (Horizon 10, 20, 30, 40, 50, 60, P60, P42, M104 and M92) were mapped in the subsurface study area. Pliocene and Miocene age horizons are designated by the corresponding “P” and “M”, respectively. These Horizons divide the top-hole section into eleven main units (Units 1 through 11). The stratigraphic interpretations and inferred lithologies are based primarily on seismic character of the 3D reprocessed seismic, AUV data and limited offset well data. Predicted depths and thicknesses associated with each of the mapped horizons and sequences are displayed on the attached Top-hole Prognosis Chart for the proposed MC562 “B” and “B1” drilling location (Plate 10). Clays transition into more shaley units below the Pleistocene section.

At the proposed wellbore, the Pleistocene sediments are about 2,772 ft thick and comprised of predominantly fine-grained, stacked sequences of thick mass transport deposits and parallel stratified hemipelagic clays interlayered with thin debris flows; thin silts and sands may be present (Units 1 through 7). The Pliocene section is divided into two separate units (Units 8 and 9). Unit 8 is about 842 ft thick and comprised of sand-prone distal channel-levee deposits and debris flow deposits interbedded with fine-grained clayey-shaley debris flow deposits. Thin marls, siltstones and sandstones may be present across Unit 8. Unit 9 is about 347 ft thick and comprised of mostly clayey to shaley mass transport deposits interlayered with potential thin siltstones to sandstones near its base. Unit 10 is about 1,223 ft thick and comprised of coarse-grained debris flow deposits overlying fine-grained debris flow deposits, directly above a thick coarse-grained stacked canyon system. The Upper part of Unit 11 represents the base of this assessment's investigation and is comprised of about 252 ft of mostly fine-grained distal levee deposits with possible thin siltstones.

**Fault Penetrations.** The proposed wellbore will ***not*** intersect any faults in the top-hole section.

**Shallow Gas.** No high amplitude anomalies interpreted to represent shallow gas will be penetrated in the top-hole section by a vertical wellbore at the proposed wellsite. However, several isolated amplitude anomalies representing possible shallow gas in the top-hole section are scattered within 2,000 ft of the proposed wellbore and are illustrated on Plate 6. The closest amplitude anomaly indicative of possible shallow gas is located about 165 ft west within Unit 10 (Plates 6 and 8). This amplitude anomaly lies at a depth of about 10,910 ft TVDss (4,474 ft BML). No evidence of shallow gas was measured at this same interval for the nearby MC 562- 1 well.

**Gas Hydrate.** Temperature and pressure conditions are favorable for the presence of gas hydrates within the study area. The base of the gas hydrate stability zone (BGHSZ) is sometimes manifested in seismic data either by the occurrence of a "bottom-simulating" reflector (BSR) or by a lineation formed by the tops of shallow gas accumulations (high amplitude anomalies) that may group just below the BGHSZ. A classic cross-cutting BSR was not observed in the study area; however, a theoretical BGHSZ was modeled for the proposed well path using the fundamental gas hydrate phase equilibrium curve which requires input for temperature, pressure, gas mixture and salinity (Sloan, 1998). The resulting theoretical BGHSZ is estimated to occur at approximately 1,460 ft BML (7,896 ft TVDSS), within lower Unit 5.

Disseminated and fracture-filling gas hydrates, if present, may occur in fine-grained sediments above the base of gas hydrate stability zone. However, the potential for encountering massive subsurface gas hydrates is ranked as ***Negligible***, due primarily to the lack of coarse-grained sediments above the BGHSZ.

**Shallow Water Flow (SWF).** The proposed MC 562 "B" and "B1" wells are sited in an area within Mississippi Canyon Protraction that has experienced numerous instances of SWF events (BOEM, 2011) within Pleistocene age sediments and in some cases resulted in well losses. The closest offset well to the proposed MC 562 "B" location is the Isabela well MC 562-1, which is about 190 ft to the northwest. The top-hole section of MC 562-1 was drilled with seawater. No SWF was referenced while drilling the MC 562-1 top-hole section. The Pleistocene section from seafloor to P60 has been interpreted as being predominantly fine-grained and therefore has been assessed a ***Negligible*** potential for SWF. The potentially sand-prone intervals within the Pliocene and Miocene top-hole sections have been assessed either a ***Low*** or ***Moderate*** potential for SWF, depending on the interpretation of sand content (Plate 10) and potential for overpressure based on the nearby offset well and seismic velocity analysis.

Standard SWF mitigation practices are recommended when drilling through any intervals that have been assessed a ***Low*** or ***Moderate*** potential for SWF in the top-hole section.

**Closing.** The proposed MC 562 "B" and "B1" well locations appear to be generally favorable for appraisal well drilling operations. We advise caution based on this assessment, but believe the risk of danger to personnel and damage to the borehole, equipment and environment is generally ***Low***, provided strict adherence to proper drilling and cementing procedures is followed concerning these hazards until the first pressure containment string is in place.

| Prepared By: | Reviewed By: |
|---|---|
| Craig Scherschel<br>Senior Geohazards Specialist<br>BP America, Inc. | Jeff Dingler<br>Lead Geohazards Specialist<br>BP America, Inc. |
| April 3, 2018 | April 3, 2018 |

**REFERENCES:**

Bureau of Ocean Energy Management, 2014, "Notice to Lessees and Operators (NTL) of Federal Oil, Gas and Sulphur Leases in the Outer Continental Shelf (OCS), Gulf of Mexico OCS Region, Military Warning and Water Test Areas". United States Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, NTL 2014-G04. Effective Date: June 1, 2014.

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Bureau of Ocean Energy Management, 2005, Notice to lessees and operators of federal oil, gas and sulphur leases and pipeline right-of-way holders in the outer continental shelf, Gulf of Mexico OCS region, Archaeological resource surveys and reports: U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico, NTL 2005-G07, Effective Date: July 1, 2005.

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C&C Technologies Survey Services, Inc. (C&C), 2009, “Archaeological, Engineering and Hazard Study, Galapagos Development Survey, Proposed Isabela, Santiago, Santa Cruz Infield Flowline Routes, Block 562 (*OCS-G-19966) to Block 474 (OCS-G-26259)*, Mississippi Canyon Area, Project No. 097364-097423, issued to BP America Inc., November 2009.

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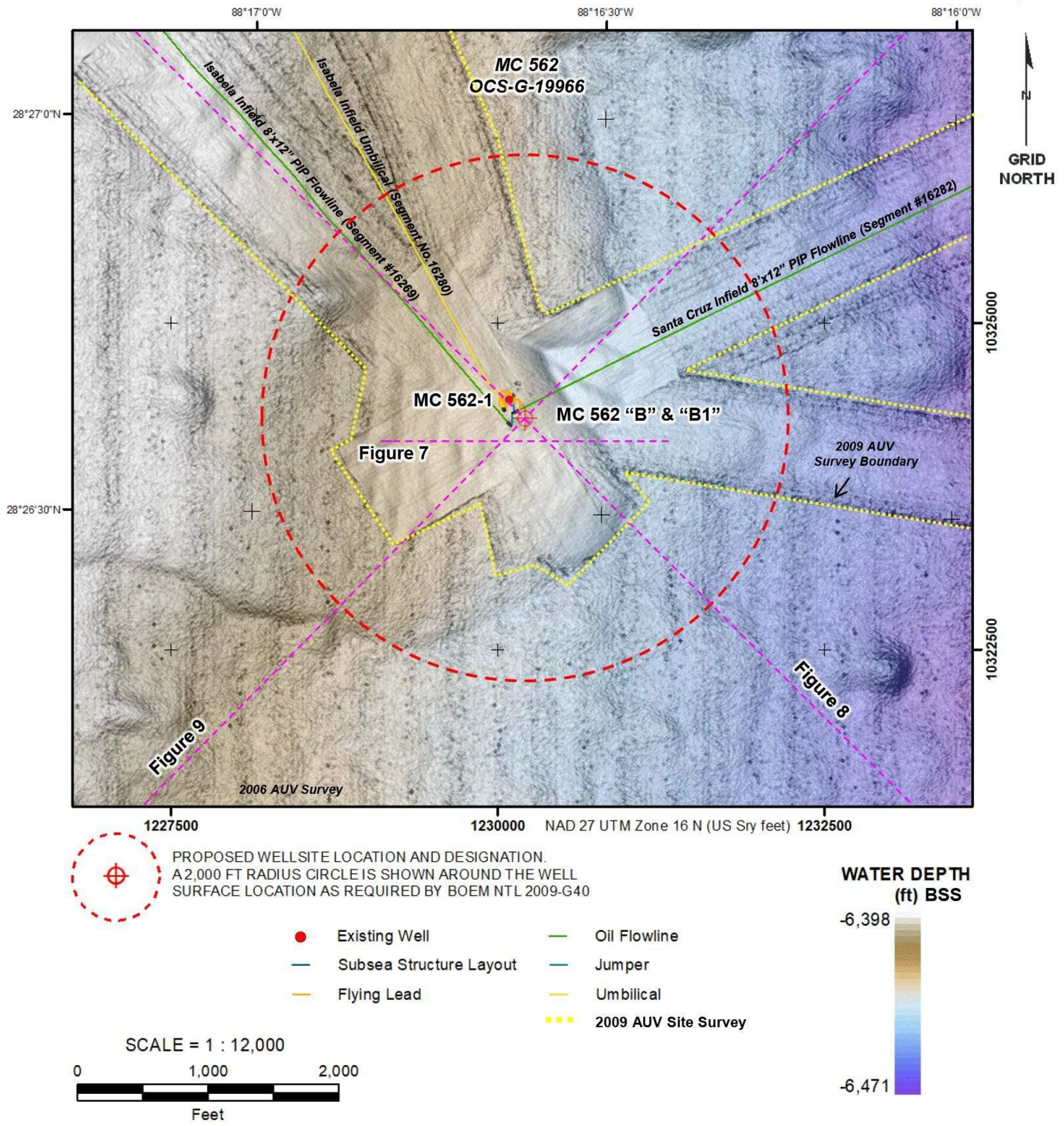
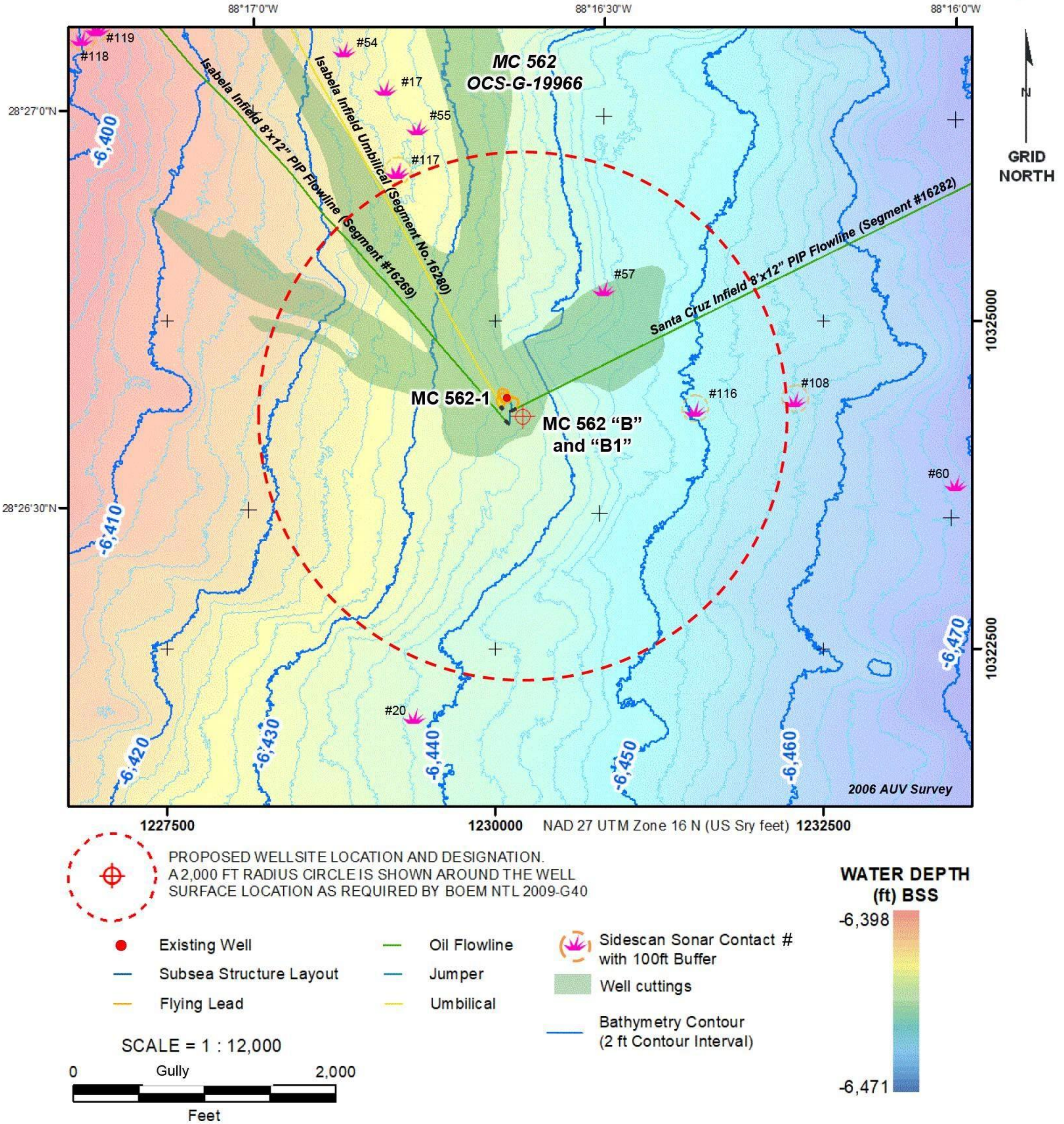
Sloan, E.D. Jr., Clathrate Hydrates of Natural Gases, Marcel Dekker Inc., New York City (1998).

ATTACHMENTS:

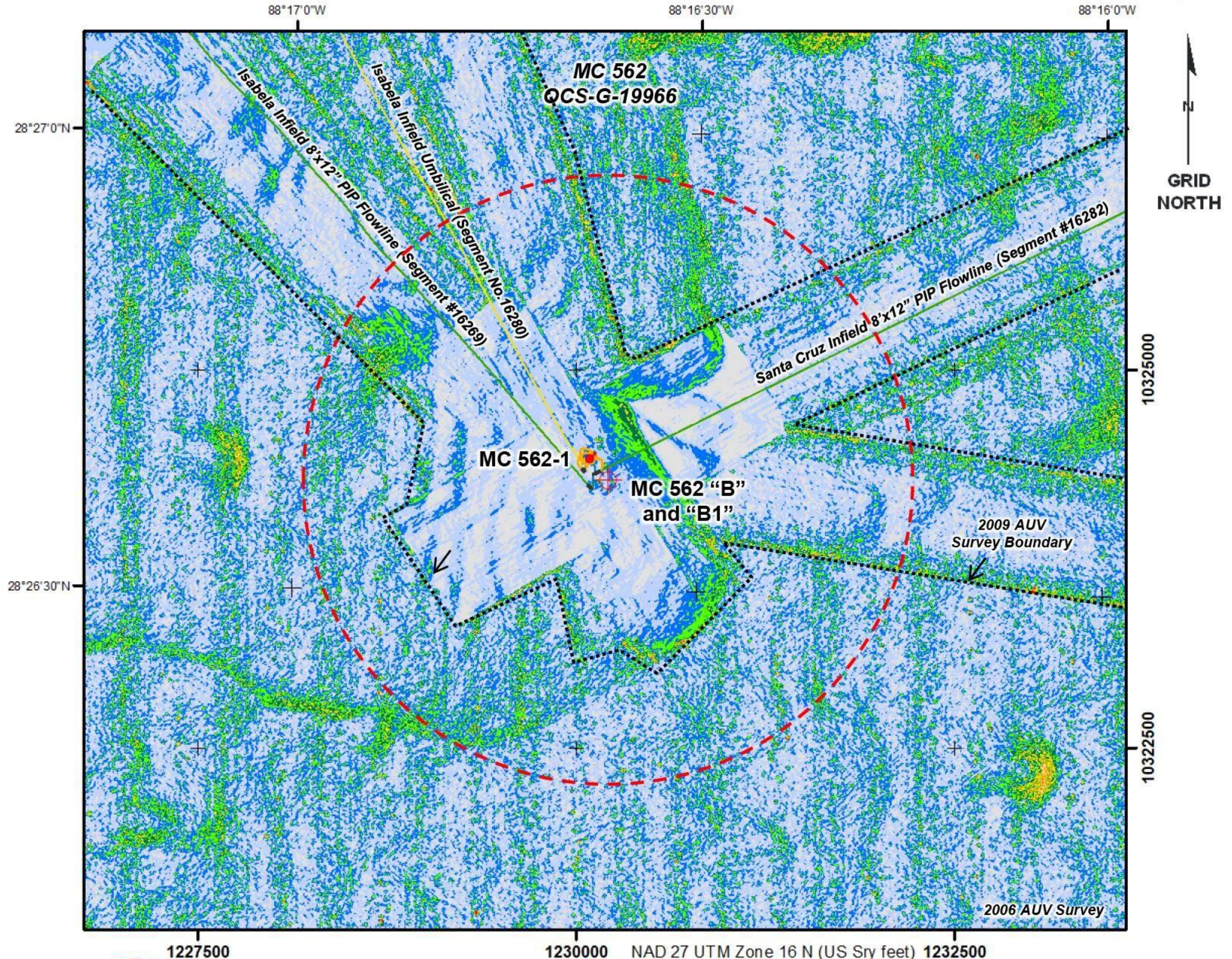
| | |
|---|---|
| Plate 1 | AUV Seafloor Rendering, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 2 | AUV Water Depth and Seafloor Features, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 3 | AUV Seafloor Gradient, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 4 | AUV Multibeam Backscatter, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 5 | AUV Side Scan Sonar Mosaic, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 6 | Sub-Surface Geologic Features, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 7 | Portion of 2006 AUV Line Isabela, 206.1.a.0.et.sub.part-part02.sc, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 8 | 3D Seismic Section, Portion of Inline 1976, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 9 | 3D Seismic Section, Portion of Crossline 8016, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |
| Plate 10 | Top-hole Prognosis Chart, Isabela Prospect, Block 562, Mississippi Canyon Area, Proposed Wellsites MC 562 "B" and "B1" |




# AUV SEAFLOOR RENDERING
# ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA
# PROPOSED WELLSITES MC 562 "B" AND "B1"




# AUV WATER DEPTH AND SEAFLOOR FEATURES
# ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA
# PROPOSED WELLSITES MC 562 "B" AND "B1"




PROPOSED WELLSITE LOCATION AND DESIGNATION.
A 2,000 FT RADIUS CIRCLE IS SHOWN AROUND THE WELL SURFACE LOCATION AS REQUIRED BY BOEM NTL 2009-G40

- Existing Well
- Subsea Structure Layout
- Flying Lead
- Oil Flowline
- Jumper
- Umbilical
- 2009 AUV Site Survey

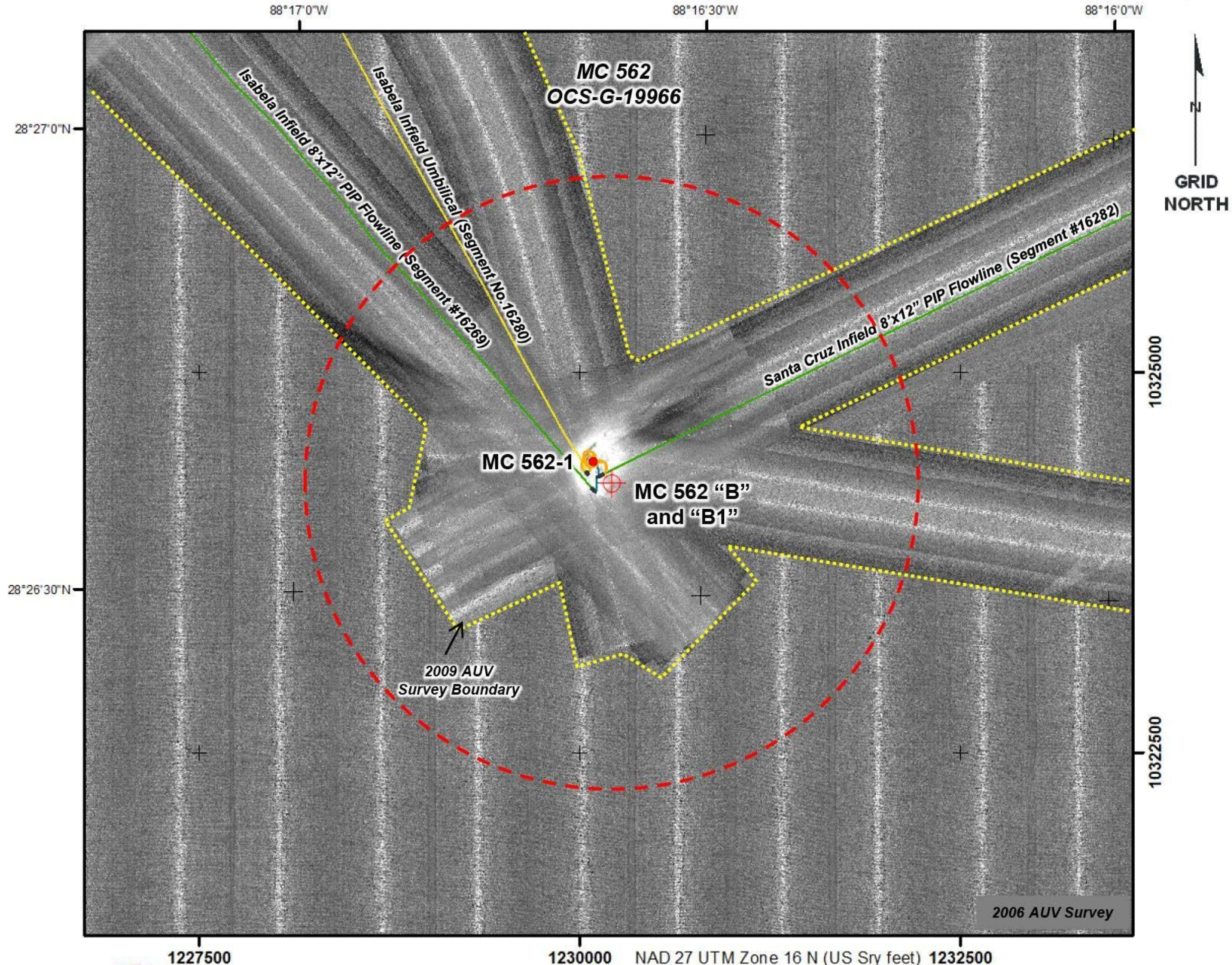
SCALE = 1 : 12,000

0 1,000 2,000
Feet

**SEAFLOOR SLOPE (degrees)**

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 4.5
- 4.5 - 5

# AUV SEAFLOOR GRADIENT
# ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA
# PROPOSED WELLSITES MC 562 "B" AND "B1"



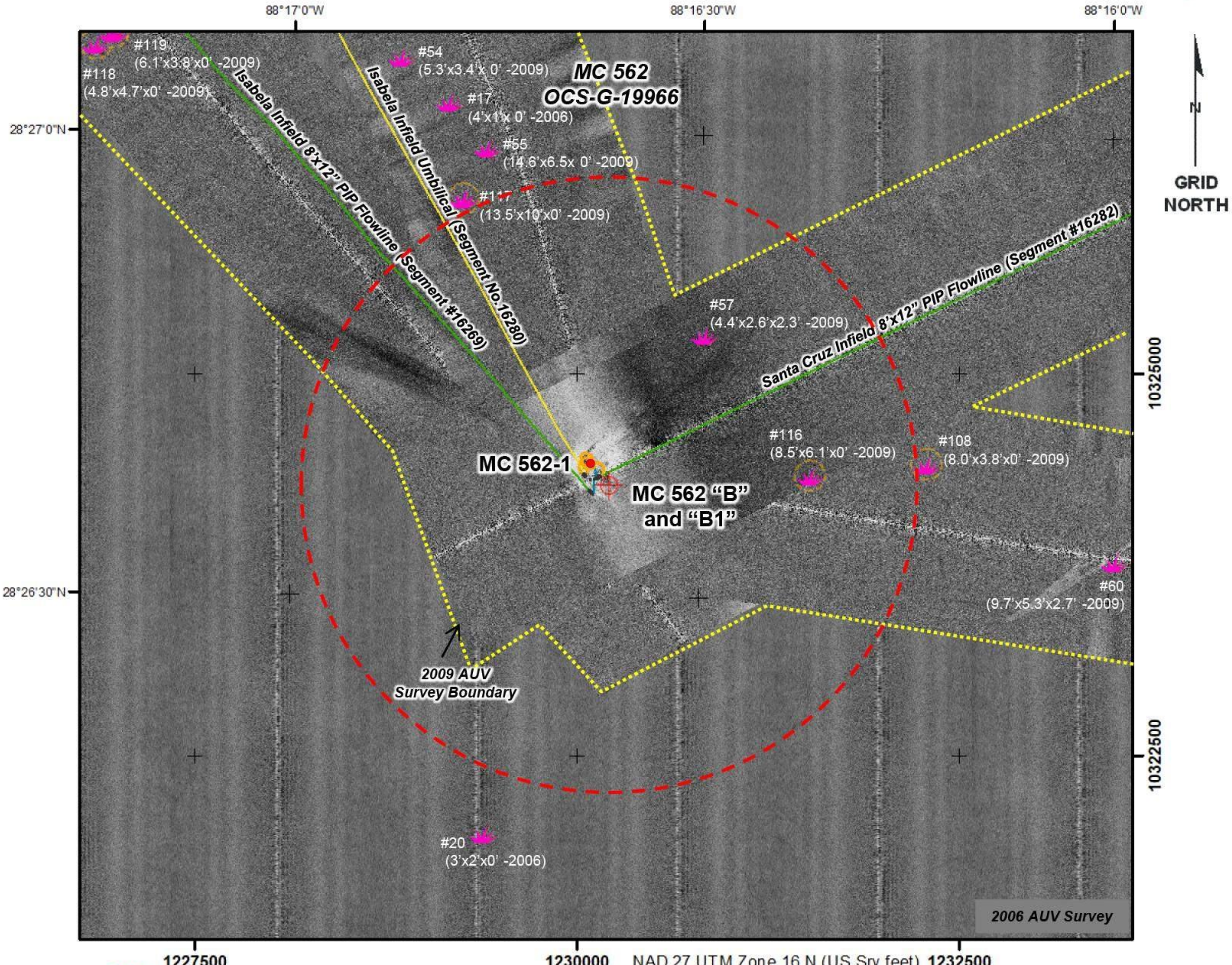

PROPOSED WELLSITE LOCATION AND DESIGNATION.
A 2,000 FT RADIUS CIRCLE IS SHOWN AROUND THE WELL SURFACE LOCATION AS REQUIRED BY BOEM NTL 2009-G40

Existing Well
Subsea Structure Layout
Flying Lead
Oil Flowline
Jumper
Umbilical
2009 AUV Site Survey

SCALE = 1 : 12,000
0 1,000 2,000
Feet

RELATIVE SEAFLOOR BACKSCATTER INTENSITY
High
Low

# AUV MULTIBEAM BACKSCATTER
# ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA
# PROPOSED WELLSITES MC 562 "B" AND "B1"




PROPOSED WELLSITE LOCATION AND DESIGNATION.
A 2,000 FT RADIUS CIRCLE IS SHOWN AROUND THE WELL SURFACE LOCATION AS REQUIRED BY BOEM NTL 2009-G40

SIDE SCAN SONAR REFLECTIVITY

High

Low

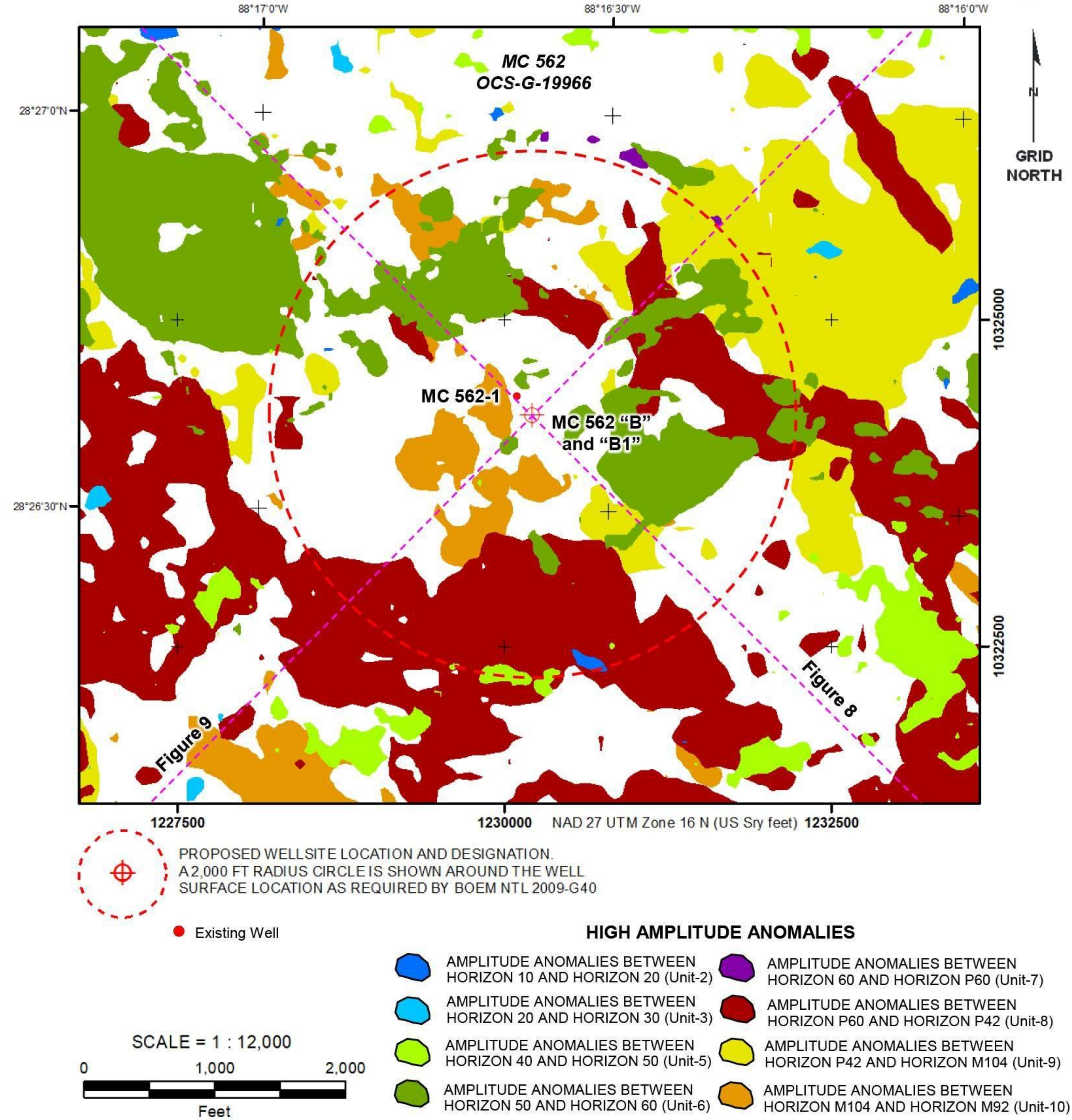
- Existing Well
- Subsea Structure Layout
- Flying Lead
- Oil Flowline
- Jumper
- Umbilical
- Sidescan Sonar Contact # with 100ft Buffer ( Year of survey)
- 2009 AUV SSS Site Survey

SCALE = 1 : 12,000

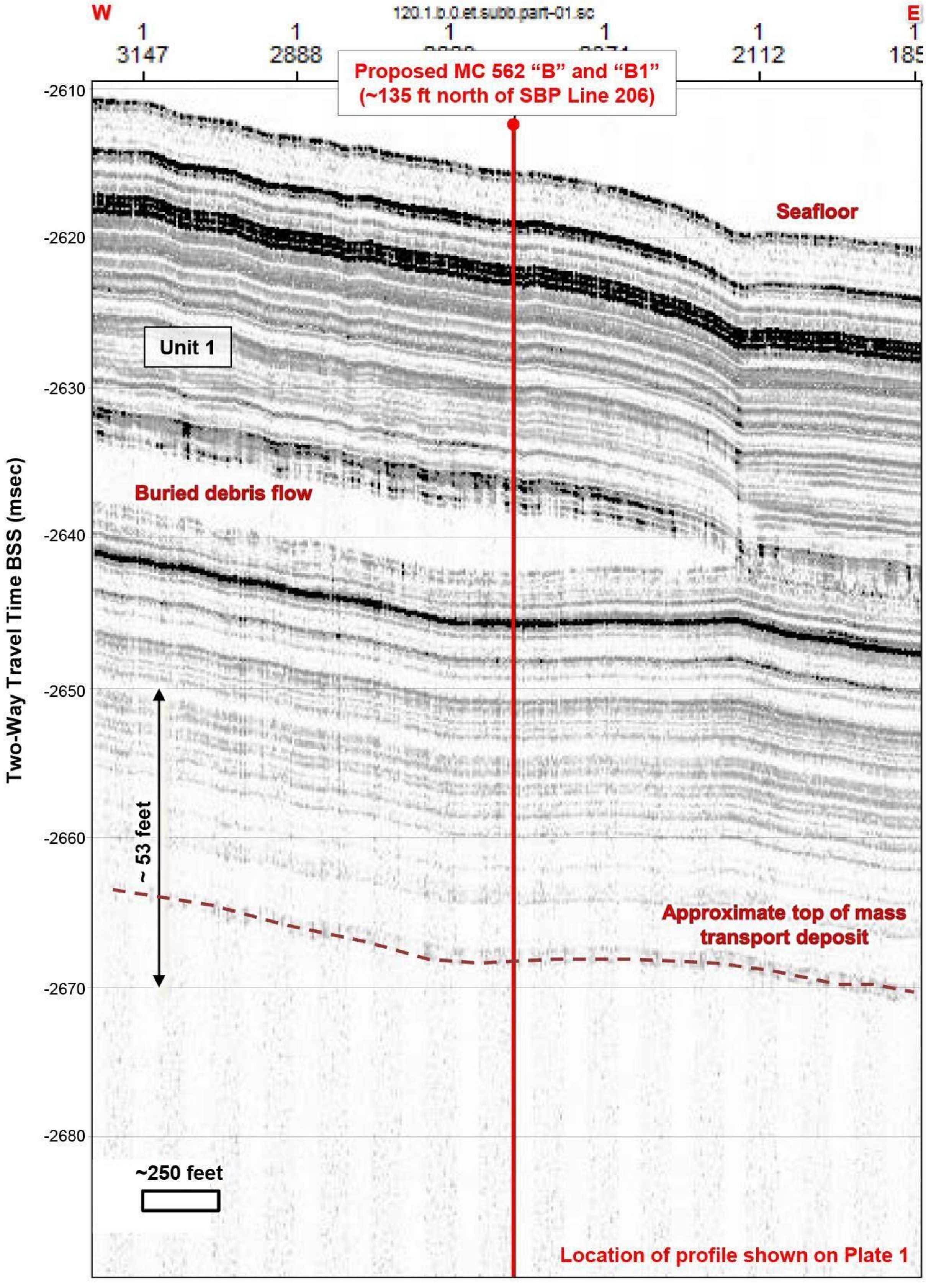
0 1,000 2,000

Feet

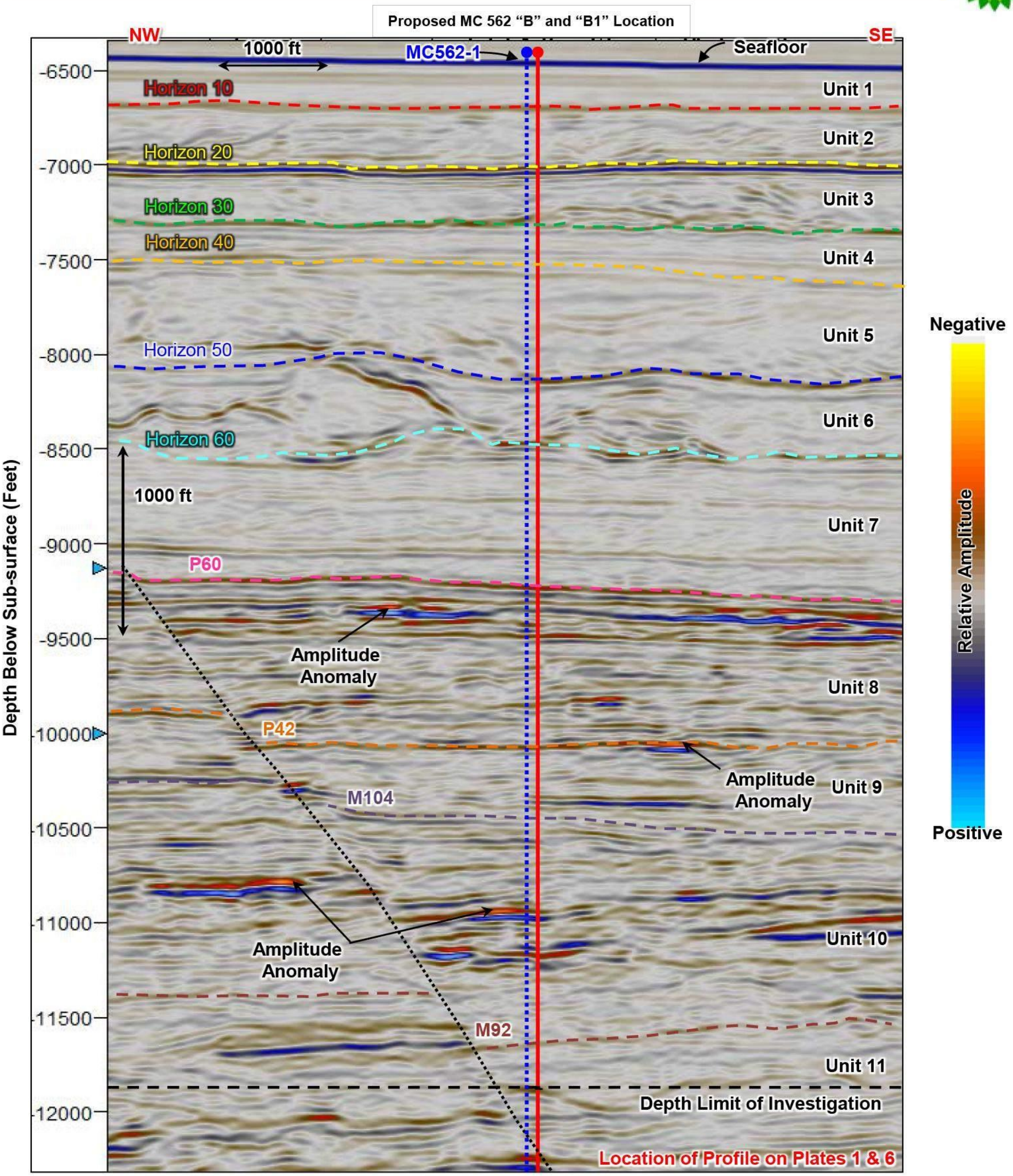
# AUV SIDE SCAN SONAR MOSAIC
# ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA
# PROPOSED WELLSITES MC 562 "B" AND "B1"



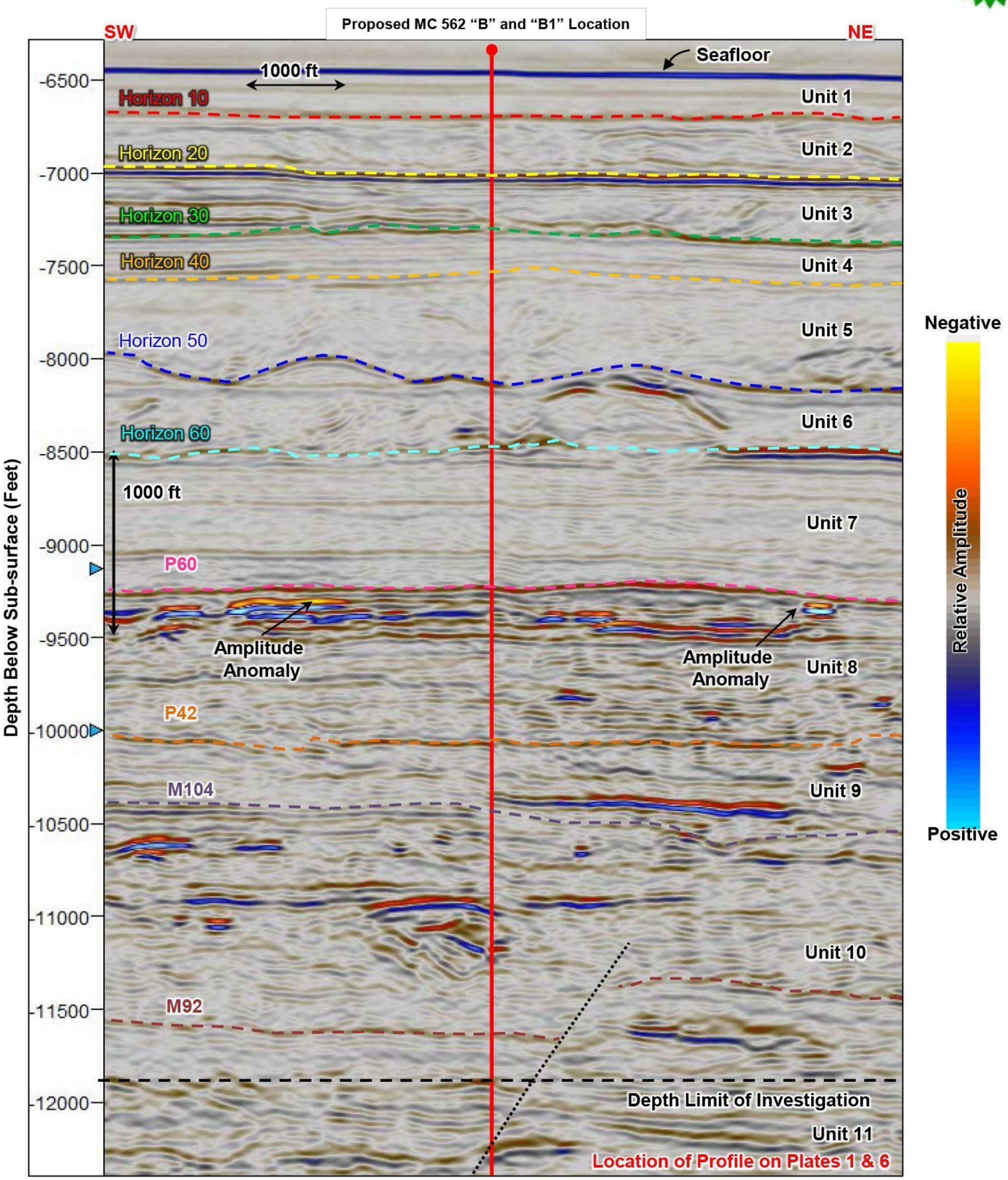

**SUB-SURFACE GEOLOGIC FEATURES
ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA
PROPOSED WELLSITES MC 562 "B" AND "B1"**




**PORTION OF 2006 AUV LINE Isabela, 206.1.a.0.et.sub.part-02.sc**
**ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA**
**PROPOSED WELLSITES MC 562 "B" AND "B1"**



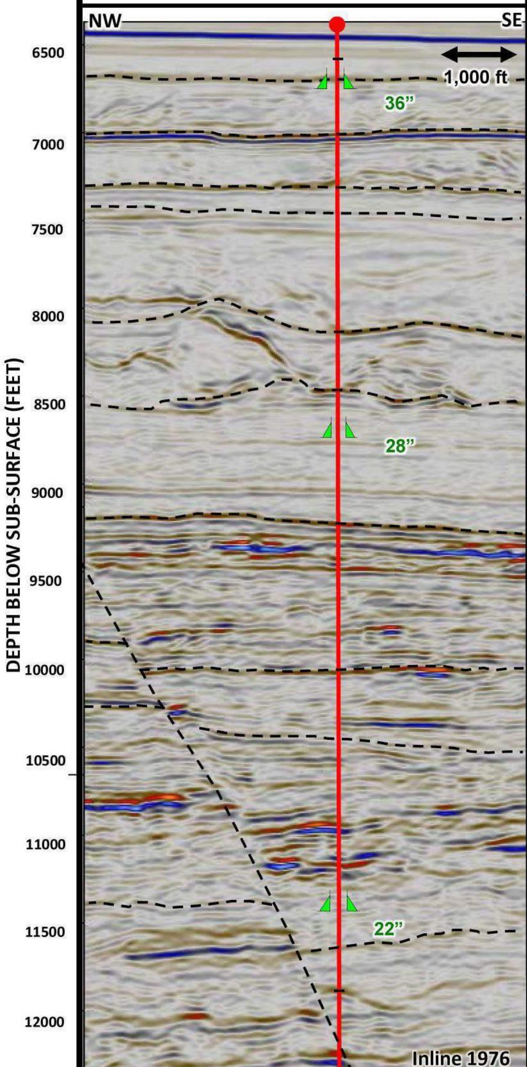

**3D SEISMIC SECTION, PORTION OF INLINE 1976, ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA PROPOSED WELLSITES MC 562 "B" AND "B1"**




# 3D SEISMIC SECTION, PORTION OF CROSSLINE 8016, ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA PROPOSED WELLSITES MC 562 “B” AND “B1”

BP AMERICA INC.
SITE CLEARANCE LETTER, PROPOSED MC 562 "B" AND "B1" LOCATION
MISSISSIPPI CANYON, GULF OF MEXICO

**3D Seismic Section**
**Proposed Wellsite MC 562 "B" and "B1"**
**Inline 1976 at Trace 8016**




| Horizon & Unit | Inferred Lithology & Top-hole Conditions | DEPTHS BML (Feet) | DEPTHS TVDSS (Feet) | THICKNESS (Feet) | SHALLOW GAS POTENTIAL | SHALLOW WATER FLOW POTENTIAL |
|---|---|---|---|---|---|---|
| Seafloor | *Relatively smooth seafloor, slopes ~1.3° to E-SE* | 0 | 6436 | | | |
| (Unit 1) | *Parallel stratified hemipelagic clays interlayered with debris flow deposits.* | | | 240 | Negligible | Negligible |
| Horizon 10 | | 240 | 6676 | | | |
| (Unit 2) | *Predominantly clay-prone debris flow deposits interbedded with possible thin silts at the base of unit.* | | | 315 | Negligible | Negligible |
| Horizon 20 | | 555 | 6991 | | | |
| (Unit 3) | *Predominantly clay-prone debris flow deposits interbedded with possible thin silts, overlying thick clay-prone mass transport deposit.* | | | 313 | Negligible | Negligible |
| Horizon 30 | | 868 | 7304 | | | |
| (Unit 4) | *Mostly clays interbedded w/ thin clay-prone debris flows and possible thin silts.* | | | 218 | Negligible | Negligible |
| Horizon 40 | | 1086 | 7522 | | | |
| (Unit 5) | *Thick, mostly fine-grained mass transport deposit with possible thin silts and sands, overlying predominantly clay-prone debris flow deposits interbedded with possible thin silts. BGHSZ is about at the base of Unit 5.* | | | 589 | Negligible | Negligible |
| BGHSZ | | *1460* | *7896* | | | |
| Horizon 50 | | 1675 | 8111 | | | |
| (Unit 6) | *Channelized deposit that has been disrupted by a regional slope failure; mostly fine-grained but may have localized sands near the base.* | | | 340 | Negligible | Negligible |
| Horizon 60 | | 2015 | 8451 | | | |
| (Unit 7) | *Mostly clays interbedded with thin debris flows and possible thin silts.*<br>*Mostly clay-prone debris flows interbedded with thin silts or sands.* | | | 757 | Negligible | Negligible |
| Horizon P60 | | 2772 | 9208 | | | |
| (Unit 8) | *Sand-prone distal channel-levee deposits; thin siltstones & marls.*<br>*Fine-grained debris flows and thin siltstones to sandstones.*<br>*Coarse-grained debris flows and thin siltstones and shale.*<br>*Fine-grained debris flows and thin siltstones to sandstones & marls.* | | | 842 | Negligible | Moderate |
| Horizon P42 | | 3614 | 10050 | | | |
| (Unit 9) | *Mostly clayey/shaley mass transport deposits interlayered with potential thin siltstones to sandstones near base of interval.* | | | 347 | Negligible | Low |
| Horizon M104 | | 3961 | 10397 | | | |
| (Unit 10) | *Coarse-grained debris flows and thin siltstones, marls and shale.*<br>*Mostly fine-grained deposits of shale and siltstones.*<br>*Stacked canyon system comprised mostly of shales/clays with interlayered siltstones and sandstones.* | | | 1223 | Negligible | Moderate |
| | *Mostly fine-grained distal levee deposits with possible thin siltstones.* | | | | Negligible | Low |
| Horizon M92 | | 5184 | 11620 | | | |
| (Unit 11) | *Mostly fine-grained distal levee deposits with possible thin siltstones.* | | | 252 | Negligible | Low |
| Depth Limit of Investigation | (Depth Limit of Investigation) | 5436 | 11872 | | | |

Unit and Horizon nomenclature modified from previous studies in the area.

Risk Scale: Negligible | Low | Moderate | High

"B" Surface Location at X = 1,230,214 ft; Y = 10,324,261 ft
"B1" Surface Location at X = 1,230,247 ft; Y = 10,324,239 ft
UTM Zone 16 N (US ft) Geodetic Datum: NAD 1927

BML = Below Mudline
BGHSZ = Base of Gas Hydrate Stability Zone
TVDSS = True Vertical Depth Subsea

# TOP-HOLE PROGNOSIS CHART, ISABELA PROSPECT, BLOCK 562, MISSISSIPPI CANYON AREA, PROPOSED WELLSITES MC 562 "B" AND "B1"

bp

Plate 10

# Appendix D: Wastes and Discharges Tables (Projected Generated Wastes and Projected Ocean Discharges)

# TABLE 1. WASTES YOU WILL GENERATE, TREAT AND DOWNHOLE DISPOSE OR DISCHARGE TO THE GOM

please specify if the amount reported is a total or per well amount

| I2<br>Projected generated waste for a 120 day well | | | | Projected ocean discharges | | | | | | Projected Downhole Disposal |
|---|---|---|---|---|---|---|---|---|---|---|
| **Type of Waste** | **Composition** | **Projected Amount** | | **Discharge Rate** | | | | | **Discharge Method** | **Answer yes or no** |
| **Will drilling occur ? If yes, you should list muds and cuttings** | | | | | | | | | | |
| Water Based Fluid | Spent drilling fluid drilling riserless hole plus pad mud to fill the hole | 50,000 | bbl/well | 7 | days | @ | 7,143 | bbl/day | Seafloor | No |
| Cuttings wetted with Water Based Fluid | Water base interval | 4,110 | bbl/well | 7 | days | @ | 587 | bbl/day | Seafloor | No |
| Excess Cement Slurry | Excess mixed cement, including additives & waste from equipment wash down after a cement operation | 70 | bbl/well | 7 | cmt jobs | @ | 10.00 | bbl/cmt job | Surface | No |
| Cuttings wetted with Synthetic Based Fluid | Drill cuttings, cement cuttings, & synthetic base mud retained on cuttings | 2,646 | bbl/well | 25 | days | @ | 106 | bbl/day | Surface | No |
| Small Volume Drilling Fluid Discharges associated with Cuttings | Displaced interfaces, accumulated solids in sand traps, pit clean-out solids, & centrifuge discharges made while changing the mud weight | 142 | bbl/well | 25 | days | @ | 6 | bbl/day | Surface | No |
| Cement transfer losses | Bulk transfer between vessels | 1,800 | sks/well | 6 | events | @ | 300 | sks/event | Surface | No |
| Barite transfer losses | Bulk transfer between vessels | 500 | sks/well | 3 | events | @ | 167 | sks/event | Surface | No |
| **Will humans be there? If yes, expect conventional waste** | | | | | | | | | | |
| Domestic Waste / Gray Water | Food waste, drainage from dishwasher, shower, laundry, bath, & washbasin drains | 41,561 | bbl/well | 120 | days | @ | 346 | bbl/day | Surface | No |
| Sanitary Waste | Treated human body waste discharged from toilets & urinals | 16,971 | bbl/well | 120 | days | @ | 141 | bbl/day | Surface | No |
| **Is there a deck? If yes, there will be Deck Drainage** | | | | | | | | | | |
| Deck Drainage | Deck washdown & rain water | 40,007 | bbl/well | 120 | days | @ | 333 | bbl/day (avg) | Surface | No |
| **Will you conduct well treatment, completion, or workover?** | | | | | | | | | | |
| Well Treatment Fluids | Stimulations fluids including acids, solvents & propping agents | 750 | bbl/well | 1 | events | @ | 750 | bbl/event | Surface | No |
| Completion Fluids | Salt solutions, weighted brines, polymers & various additives | 3,000 | bbl/well | 50 | days | @ | 60 | bbl/day | Surface | No |
| Workover Fluids - **If applicable** | Salt solutions, weighted brines, polymers, & other speciality additives | 1,000 | bbl/well | 20 | days | @ | 50 | bbl/day | Surface | No |
| **Miscellaneous discharges. If yes, only fill in those associated with your activity.** | | | | | | | | | | |
| Desalinization Unit Discharge | Wastewater associated with the process of creating freshwater from seawater | 1,753,488 | bbl/well | 120 | days | @ | 14612 | bbl/day | Surface | No |
| Blowout Preventer Fluid | Fluid used to actuate the hydraulic equipment on the BOP | 1800 | bbl/well | Daily average | | | 15 | bbl/day | N/A | N/A |
| Uncontaminated Ballast Water | Uncontaminated seawater added or removed to maintain proper draft | 754,286 | bbl/well | 120 | days | @ | 6,286 | bbl/day (avg) | Surface | No |
| Uncontaminated Bilge Water | Water that collects in the vessels bilge | 1,540 | bbl/well | 120 | days | @ | 13 | bbl/day (avg) | Surface | N/A |
| Cement discharged at seafloor | Excess mixed cement slurry | 800 | bbl/well | 2 | event | @ | 400 | bbl/day | Seafloor | No |
| Fire Water | Uncontaminated seawater/freshwater used for fire control | 153,120 | bbl/well | 120 | days | @ | 8,932 | bbl/week | Surface | No |
| Cooling Water / Utility Water | Uncontaminated seawater | 81,896,364 | bbl/well | 120 | days | @ | 682,470 | bbl/day | Surface | No |
| Sea Water / Fresh Water that has been Chemically Treated | Biocide, corrosion inhibitors, or other chemicals used to prevent corrosion or fouling of piping or equipment | N/A | bbl/well | | event | @ | | bbl/event | Surface | No |
| Sub Sea Fluid Discharges | Wellhead Preservation, Hydrate Control, Umbilical Steel Tube Storage, Leak Tracer, & Riser Tensioner Fluids | N/A | | | | | | | N/A | N/A |
| **Will you produce hydrocarbons? If yes fill in for produced water.** | | | | | | | | | | |
| Produced Water | Water brought up from hydrocarbon-bearing strata during extraction of oil & gas | N/A | | N/A | | | | | N/A | N/A |
| **Will you be covered by an individual or General NPDES permit ?** | | GMG290000 | | | | | | | | |
| NOTE: If you will not have a type of waste, enter NA in the row. | | Red = Drlg Eng, **Yellow** = Completion Eng, **Blue** = Waste Specialist, **Green = Calculator Tool** | | | | | | | | |

# WASTE TABLE FOR SEMI-SUBMERSIBLES

## TABLE 2. WASTES YOU WILL TRANSPORT AND /OR DISPOSE OF ONSHORE

| Please specify whether the amount reported is a total or per well | | | Number of operational days: | 120 | Asset Name: | Nakika |
|---|---|---|---|---|---|---|
| **Well Name: Isabela 2** | **Projected generated waste** | **Solid and Liquid Wastes transportation** | **Waste Disposal** | | | |
| **Type of Waste** | **Composition** | **Transport Method** | **Name/Location of Facility** | **Quantity** | **Units** | **Disposal Method** |
| **Will drilling occur ? If yes, fill in the muds and cuttings.** | | | | | | |
| Unused Synthetic-based drilling fluid | NovaPlus B and barite | Liquid mud storage on workboat | Baroid / MI Swaco Fouchon LA | 400 | bbls/well | For reuse |
| Synthetic-based drilling mud solids and barite | SBM and barite from pit cleanout | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360 Fouchon, LA | 8964 | bbls/well | Deepwell injection on land |
| Contaminated Synthetic base mud | NovaPlus B and barite | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360, Fourchon, LA | 195 | bbls/well | Landfill |
| Drilling mud contaminated absorbents | Absorbent pads contaminated with drilling muds | Barged in (Omega 2 yard boxes) | Omega Waste Management, Patterson, LA | 2 | tons/well | Recycle |
| Excess barite | Excess barite from vessel tank cleaning | Transported by vehicle (supersacks) | River Birch Landfill, Avondale, LA | 5 | tons/well | Reuse / Landfill |
| Excess cement | Excess cement from vessel tank cleaning | Transported by vehicle (supersacks) | River Birch Landfill, Avondale, LA | 528 | tons/well | Reuse / Landfill |
| Rig Drilling washwater | Cleaning out of mud tanks | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360, Fourchon LA | 744 | bbls/well | Deepwell injection on land |
| Contaminated Completion Fluids | Used Completion fluids | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360 Fourchon LA | 1116 | bbls/well | Deepwell injection on land |
| Completion Fluids | Used Completion fluids | Liquid storage tanks on workboat | Baker Inteq / MI Swaco Fourchon LA | 3060 | bbls/well | For reclamation & re-use |
| **Will you produce hydrocarbons? If yes fill in for produced sand.** | | | | | | |
| | | | | | | |
| **Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.** | | | | | | |
| Well Related Hazardous Waste | Rig lab titrations containing isopropanol alcohol, silver nitrate etc. | Barged in (5 gallon DOT containers) | Chemical Waste Management, Sulphur, LA | 0.024 | ton/well | Incineration / Landfill |
| Rig Maintenance Wastes (painting, blasting) | Paint thinner, paint chips, blast media, aerosol cans | Barged in (drums or totes) | River Birch Landfill, Avondale, LA and Chemical Waste Management, Sulphur, LA | 2.4 | ton/well | Incineration / Landfill |
| Rig Maintenance Wastes (non hazardous) | Oily rags, pads, oil filters etc. | Barged in (totes) | Omega Waste Management, Patterson, LA | 3 | ton/well | Reuse / Landfill |
| Rig Used oil | Lube oil, hydraulic oil, glycol | Barged in (drums) | Omega Waste Management, Patterson, LA | 8.4 | bbls/well | Recycle |
| Domestic waste | Municipal trash | Barged in (supersacks) | River Birch Landfill, Avondale, LA | 3.6 | ton/well | Incineration / Landfill |
| Scrap Metal | scrap piping, grating and other metals | Barged in (scrap baskets) | Southern Scrap, Houma, LA | 3 | ton/well | Recycle |
| Universal Waste | Batteries | Barged in (DOT drums) | LEI, Hammond, LA | 0.6 | ton/well | Recycle |
| Universal Waste | Fluorescent light bulbs | Barged in (DOT drums) | LEI, Hammond, LA | 0.12 | ton/well | Recycle |
| Misc. unused chemical | Pills, spacers, additives etc. | Barged in (totes) | River Birch Landfill, Avondale, LA | 288 | bbls/well | Recycle |
| Oily water | Washwater rig equipment | Transported in (15 barrel cuttings boxes) | Omega Waste Management, Patterson, LA | 1620 | bbls/well | Recycle |
| Recycled materials | Plastic, paper, aluminum | Barged in (supersacks) | Tech Oil, Iberia, LA | 6 | ton/well | Recycle |
| Special Waste – Radioactive | radioactive sand/ radioactive proppants used for tracers<br><br>NOTE: Tracer (Man-made) is handled, for DOT Classification, based on the Activity of the package; classification could be Limited Quantity, Low Specific Activity or Surface Contaminated Object | Barged in:<br>1. Non-Bulk: Drum 1A2 or<br>2. Bulk: Marine Portable Tanks, Cuttings Boxes<br>NOTE: With tracer waste disposal, the Manufacture of the tracer holds a Specific License and this license number must be listed on the manifest/ shipping document.<br>• For NORM: Ra-226, Ra-228, Th-228<br>• For Tracer: Ir-192, Sc-46, Sb-124 | EcoServ | 300 | bbls/well | Deepwell injection on land |

NOTE: All operations are expected to follow BP Waste procedures and / or contractor specific procedures where required or are more stringent.

# Appendix E: Air Emissions Information – Form BOEM-0138

OMB Control No. 1010-0151
OMB Approval Expires: 03/31/2018

# EXPLORATION PLAN (EP)
# AIR QUALITY SCREENING CHECKLIST

| | |
|---|---|
| **COMPANY** | BP Exploration & Production Inc. |
| **AREA** | Mississippi Canyon |
| **BLOCK** | MC562 |
| **LEASE** | OCS-G 19966 |
| **PLATFORM** | Not Applicable |
| **WELL** | Well Locations B and B-1 |
| | |
| **COMPANY CONTACT** | Donna Gyles (Air Quality)/ Adalberto Garcia (Plans) |
| **TELEPHONE NO.** | Donna Gyles (281-782-8339)./ Adalberto Garcia (281-995-2815) |
| **REMARKS** | Drill and complete 1 well |

# EMISSIONS FACTORS

| Fuel Usage Conversion Factors | Natural Gas Turbines | | Natural Gas Engines | | Diesel Recip. Engine | | REF. | DATE |
|---|---|---|---|---|---|---|---|---|
| | SCF/hp-hr | 9.524 | SCF/hp-hr | 7.143 | GAL/hp-hr | 0.0483 | AP42 3.2-1 | 4/76 & 8/84 |

| Equipment/Emission Factors | units | PM | SOx | NOx | VOC | CO | REF. | DATE |
|---|---|---|---|---|---|---|---|---|
| NG Turbines | gms/hp-hr | | 0.00247 | 1.3 | 0.01 | 0.83 | AP42 3.2-1& 3.1-1 | 10/96 |
| NG 2-cycle lean | gms/hp-hr | | 0.00185 | 10.9 | 0.43 | 1.5 | AP42 3.2-1 | 10/96 |
| NG 4-cycle lean | gms/hp-hr | | 0.00185 | 11.8 | 0.72 | 1.6 | AP42 3.2-1 | 10/96 |
| NG 4-cycle rich | gms/hp-hr | | 0.00185 | 10 | 0.14 | 8.6 | AP42 3.2-1 | 10/96 |
| | | | | | | | | |
| Diesel Recip. < 600 hp. | gms/hp-hr | 1 | 0.367 | 14 | 1.12 | 3.03 | AP42 3.3-1 | 10/96 |
| Diesel Recip. > 600 hp. | gms/hp-hr | 0.32 | 0.367 | 11 | 0.33 | 2.4 | AP42 3.4-1 | 10/96 |
| Diesel Boiler | lbs/bbl | 0.084 | 0.605 | 0.84 | 0.008 | 0.21 | AP42 1.3-12,14 | 9/98 |
| | | | | | | | | |
| NG Heaters/Boilers/Burners | lbs/mmscf | 7.6 | 0.593 | 100 | 5.5 | 84 | P42 1.4-1, 14-2, & 14 | 7/98 |
| NG Flares | lbs/mmscf | | 0.593 | 71.4 | 60.3 | 388.5 | AP42 11.5-1 | 9/91 |
| Liquid Flaring | lbs/bbl | 0.42 | 6.83 | 2 | 0.01 | 0.21 | AP42 1.3-1 & 1.3-3 | 9/98 |
| Tank Vapors | lbs/bbl | | | | 0.03 | | E&P Forum | 1/93 |
| Fugitives | lbs/hr/comp. | | | | 0.0005 | | API Study | 12/93 |
| Glycol Dehydrator Vent | lbs/mmscf | | | | 6.6 | | La. DEQ | 1991 |
| Gas Venting | lbs/scf | | | | 0.0034 | | | |

| Sulphur Content Source | Value | Units |
|---|---|---|
| Fuel Gas | 3.33 | ppm |
| Diesel Fuel | 0.1 | % weight |
| Produced Gas( Flares) | 3.33 | ppm |
| Produced Oil (Liquid Flaring) | 1 | % weight |

| Equipment Specific Emission Factors | units | PM | SOx | NOx | VOC | CO | REF. | DATE |
|---|---|---|---|---|---|---|---|---|
| West Capricorn MODU Engines | gms/hp-hr | | | 8.61 | | | IAPP | Dec-16 |

## EMISSIONS CALCULATIONS 1ST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Mississippi Canyon | MC562 | OCS-G 19966 | Not Applicable | Well Locations B and B-1 | | Donna Gyles (Air Quality)/ Adalb | Donna Gyles (2 | |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | DAYS | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: MODU West Capricorn Semi-submersible Drilling Rig** | **Average Daily Fuel Usage**<br>**Maximum Daily Fuel Usage** | | | **14182**<br>**28319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C280-16 (6785 hp each) | PRIME MOVER>600hp diesel | 54280 | 2621.724 | 28319.00 | 24 | 153 | 38.26 | 43.88 | 1029.23 | 39.45 | 286.94 | 31.61 | 36.26 | 850.48 | 32.60 | 237.11 |
| E-Gen: 1 x CAT 3512B (2180 hp) | PRIME MOVER>600hp diesel | 2180 | 105.294 | 2527.06 | 24 | 52 | 1.54 | 1.76 | 52.82 | 1.58 | 11.52 | 0.96 | 1.10 | 32.96 | 0.99 | 7.19 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 153 | 5.51 | 2.02 | 77.09 | 6.17 | 16.69 | 10.11 | 3.71 | 141.54 | 11.32 | 30.63 |
| Offshore Support Vessel 1 - Class 312 ft | VESSELS>600hp diesel(crew/supply/support) | 7200 | 347.76 | 8346.24 | 24 | 153 | 5.07 | 5.82 | 174.45 | 5.23 | 38.06 | 9.32 | 10.69 | 320.29 | 9.61 | 69.88 |
| Offshore Support Vessel 1 - Class 312 ft | VESSELS>600hp diesel(crew/supply/support) | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 5.82 | 174.45 | 5.23 | 38.06 | 2.44 | 2.79 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel 1 - Class 312 ft | VESSELS>600hp diesel(crew/supply/support) | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 5.82 | 174.45 | 5.23 | 38.06 | 2.44 | 2.79 | 83.74 | 2.51 | 18.27 |
| 2018 YEAR TOTAL | | | | | | | **60.53** | **65.12** | **1682.49** | **62.91** | **429.34** | **56.87** | **57.34** | **1512.74** | **59.55** | **381.35** |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES**<br>64.4 | | | | | | | | | | | **2144.52** | **2144.52** | **2144.52** | **2144.52** | **54626.43** |

## EMISSIONS CALCULATIONS 1ST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Mississippi Canyon | MC562 | OCS-G 19966 | Not Applicable | Well Locations B and B-1 | | Donna Gyles (Air Quality)/ Adalb | Donna Gyles (2 | |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | DAYS | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: MODU West Capricorn Semi-submersible Drilling Rig** | **Average Daily Fuel Usage** | | | **14182** | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | **28319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C280-16 (6785 hp each) | PRIME MOVER>600hp diesel | 54280 | 2621.724 | 28319.00 | 24 | 31 | 38.26 | 43.88 | 1029.23 | 39.45 | 286.94 | 6.41 | 7.35 | 172.32 | 6.61 | 48.04 |
| E-Gen: 1 x CAT 3512B (2180 hp) | PRIME MOVER>600hp diesel | 2180 | 105.294 | 2527.06 | 24 | 31 | 1.54 | 1.76 | 52.82 | 1.58 | 11.52 | 0.57 | 0.66 | 19.65 | 0.59 | 4.29 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 31 | 5.51 | 2.02 | 77.09 | 6.17 | 16.69 | 2.05 | 0.75 | 28.68 | 2.29 | 6.21 |
| Offshore Support Vessel 1 - Class 312 ft | VESSELS>600hp diesel(crew/supply/support) | 7200 | 347.76 | 8346.24 | 24 | 31 | 5.07 | 5.82 | 174.45 | 5.23 | 38.06 | 1.89 | 2.17 | 64.90 | 1.95 | 14.16 |
| Offshore Support Vessel 1 - Class 312 ft | VESSELS>600hp diesel(crew/supply/support) | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 5.82 | 174.45 | 5.23 | 38.06 | 2.44 | 2.79 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel 1 - Class 312 ft | VESSELS>600hp diesel(crew/supply/support) | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 5.82 | 174.45 | 5.23 | 38.06 | 2.44 | 2.79 | 83.74 | 2.51 | 18.27 |
| | | | | | | | | | | | | | | | | |
| **2019** | **YEAR TOTAL** | | | | | | **60.53** | **65.12** | **1682.49** | **62.91** | **429.34** | **15.79** | **16.51** | **453.01** | **16.46** | **109.23** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **2144.52** | **2144.52** | **2144.52** | **2144.52** | **54626.43** |
| | 64.4 | | | | | | | | | | | | | | | |

SUMMARY

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL |
|---|---|---|---|---|---|
| BP Exploration | Mississippi Canyon | MC562 | OCS-G 19966 | Not Applicable | Well Locations B and B-1 |

| Year | Emitted | | Substance | | |
|---|---|---|---|---|---|
| | PM | SOx | NOx | VOC | CO |
| 2018 | 56.87 | 57.34 | 1512.74 | 59.55 | 381.35 |
| 2019 | 15.79 | 16.51 | 453.01 | 16.46 | 109.23 |
| Allowable | 2144.52 | 2144.52 | 2144.52 | 2144.52 | 54626.43 |

# Supplement to International Air Pollution Prevention Certificate (IAPP Certificate)

## Record of Construction and Equipment

*Notes:*

1. This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.
2. The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.
3. Entries in boxes shall be made by inserting either a cross (x) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.
4. Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organization.



### 1 Particulars of ship

1.1 Name of ship: **WEST CAPRICORN**

1.2 IMO number: **8770821**

1.3 Date on which keel was laid or ship was at a similar stage of construction: **06 September 2009**

1.4 Length (L)* metres: **N/A**

* Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.

**2 Control of emissions from ships**

2.1 *Ozone-depleting substances* (regulation 12)

2.1.1 The following fire-extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydrochlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

| System or Equipment | Location on board | Substance |
|---|---|---|
| N/A | | |
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2.1.2 The following systems containing hydrochlorofluorocarbons (HCFCs) installed before 1 January 2020 may continue in service:

| System or Equipment | Location on board | Substance |
|---|---|---|
| N/A | | |
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2.2 *Nitrogen oxides ($NO_x$)* (regulation 13)

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

| Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method) | | | Engine #1 | Engine #2 | Engine #3 | Engine #4 | Engine #5 | Engine #6 | Engine #7 | Engine #8 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Manufacturer and model | | Caterpillar C280-16 | Caterpillar C280-16 | Caterpillar C280-16 | Caterpillar C280-16 | Caterpillar C280-16 | Caterpillar C280-16 | Caterpillar C280-16 | Caterpillar C280-16 |
| 2 | Serial number | | NKB00164 | NKB00165 | NKB00166 | NKB00167 | NKB00168 | NKB00169 | NKB00170 | NKB00171 |
| 3 | Use (applicable application cycle(s) - NTC 3.2) | | D2 | D2 | D2 | D2 | D2 | D2 | D2 | D2 |
| 4 | Rated power (kW) (NTC 1.3.11) | | 5060 | 5060 | 5060 | 5060 | 5060 | 5060 | 5060 | 5060 |
| 5 | Rated speed (RPM) (NTC 1.3.12) | | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 |
| 6 | Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2 | | – | – | – | – | – | – | – | – |
| 7 | Identical engine installation date(dd/mm/yyyy) as per 13.1.1.2 | | - | - | - | - | - | - | - | - |
| 8a | Major Conversion (dd/mm/yyyy) | 13.2.1.1 & 13.2.2 | – | – | – | – | – | – | – | – |
| 8b | | 13.2.1.2 & 13.2.3 | – | – | – | – | – | – | – | – |
| 8c | | 13.2.1.3 & 13.2.3 | – | – | – | – | – | – | – | – |
| 9a | Tier I | 13.3 | X | X | X | X | X | X | X | X |
| 9b | | 13.2.2 | – | – | – | – | – | – | – | – |
| 9c | | 13.2.3.1 | – | – | – | – | – | – | – | – |
| 9d | | 13.2.3.2 | – | – | – | – | – | – | – | – |
| 9e | | 13.7.1.2 | – | – | – | – | – | – | – | – |
| 10a | Tier II | 13.4 | – | – | – | – | – | – | – | – |
| 10b | | 13.2.2 | – | – | – | – | – | – | – | – |
| 10c | | 13.2.2 (Tier III not possible) | – | – | – | – | – | – | – | – |
| 10d | | 13.2.3.2 | – | – | – | – | – | – | – | – |
| 10e | | 13.5.2 (Exemptions) | – | – | – | – | – | – | – | – |
| 10f | | 13.7.1.2 | – | – | – | – | – | – | – | – |
| 11a | Tier III (ECA NOx only) | 13.5.1.1 | – | – | – | – | – | – | – | – |
| 11b | | 13.2.2 | – | – | – | – | – | – | – | – |
| 11c | | 13.2.3.2 | – | – | – | – | – | – | – | – |
| 11d | | 13.7.1.2 | – | – | – | – | – | – | – | – |
| 12 | AM** | installed | – | – | – | – | – | – | – | – |
| 13 | | not commercially available at this survey | – | – | – | – | – | – | – | – |
| 14 | | not applicable | – | – | – | – | – | – | – | – |

*** Refer to the 2014 Guidelines on the approved method process (resolution MEPC 243(66)*

2.3 *Sulphur oxides ($SO_X$) and particulate matter* (regulation 14)

2.3.1 When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:

.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

| | |
|---|---|
| ∎ 4.50% m/m (not applicable on or after 1 January 2012); or | – |
| ∎ 3.50% m/m (not applicable on or after 1 January 2020); or | X |
| ∎ 0.50% m/m, and/or | X |

.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of $SO_X$ emission reductions as compared to using a fuel oil with a sulphur content limit value of:

| | |
|---|---|
| ∎ 4.50% m/m (not applicable on or after 1 January 2012) | – |
| ∎ 3.50% m/m (not applicable on or after 1 January 2020) | – |
| ∎ 0.50% m/m | – |

2.3.2 When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:

.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

| | |
|---|---|
| ∎ 1.00% m/m (not applicable on or after 1 January 2015); or | – |
| ∎ 0.10% m/m, and/or | X |

.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of $SO_X$ emission reductions as compared to using a fuel oil with a sulphur content limit value of:

| | |
|---|---|
| ∎ 1.00% m/m (not applicable on or after 1 January 2015) | – |
| ∎ 0.10% m/m | – |

2.4 *Volatile organic compounds (VOCs)* (regulation 15)

| | |
|---|---|
| 2.4.1 The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585 | – |
| 2.4.2.1 For a tanker carrying crude oil, there is an approved VOC Management Plan | – |
| 2.4.2.2 VOC Management Plan approval reference: ______________________ | – |

2.5 *Shipboard incineration* (regulation 16)

The ship has an incinerator:

2.5.1 installed on or after 1 January 2000 that complies with:

| | |
|---|---|
| 2.5.1.1 resolution MEPC.76(40), as amended+ | – |
| 2.5.1.2 resolution MEPC.244(66) | – |

2.5.2 installed before 1 January 2000 that complies with:

| | |
|---|---|
| 2.5.2.1 resolution MEPC.59(33) as amended++ | – |
| 2.5.2.2 resolution MEPC.76(40) as amended+ | – |

\+ As amended by resolution MEPC.93(45).
++ As amended by resolution MEPC.92(45).

2.6 *Equivalents (*regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

| System or Equipment | Equivalent Used | Approval Reference |
|---|---|---|
| N/A | | |
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**THIS IS TO CERTIFY** that this Record is correct in all respects.

Issued at New Orleans, Louisiana on 14 December 2016

*(Place of issue)* *(Date of issue)*

ABS

**El Sharkawy, Hossame I., New Orleans Port**

*(Surveyor, American Bureau of Shipping)*

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WEST CAPRICORN - 2017 ACTUAL FUEL | | | | | | | | | | | |
| | Volume Consumed in Gallons | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | | | | | | | | | | 14,978.0 | 14054 | 8,427.0 |
| 2 | | | | | | | | | | 14,978.0 | 9,458.0 | 7,265.0 |
| 3 | | | | | | | | | | 14,978.0 | 11,122.0 | 9,431.0 |
| 4 | | | | | | | | | | 14,978.0 | 12,112.0 | 8,982.0 |
| 5 | | | | | | | | | | 14,978.0 | 12,389.0 | 7,080.0 |
| 6 | | | | | | | | | | 14,978.0 | 13,552.0 | 11,782.0 |
| 7 | | | | | | | | | | 14,978.0 | 10,858.0 | 13,869.0 |
| 8 | | | | | | | | | | 14,978.0 | 14,371.0 | 9,114.0 |
| 9 | | | | | | | | | | 14,978.0 | 14,272.0 | 9,113.0 |
| 10 | | | | | | | | | | 14,978.0 | 7,238.0 | 9,378.0 |
| 11 | | | | | | | | | | 14,978.0 | 10,778.0 | 7,819.0 |
| 12 | | | | | | | | | | 14,978.0 | 11,914.0 | 11,940.0 |
| 13 | | | | | | | | | | 14,978.0 | 10,936.0 | 19815 |
| 14 | | | | | | | | | | 14,978.0 | 10,144.0 | 13,473.0 |
| 15 | | | | | | | | | | 14,978.0 | 8,585.0 | 14,344.0 |
| 16 | **No BPXP West Capricorn Operations** | | | | | | | | | | 9,166.0 | 14,344.0 |
| 17 | | | | | | | | | | 573.0 | 8,427.0 | 10,910.0 |
| 18 | | | | | | | | | | 10,144.0 | 8,995.0 | 13,473.0 |
| 19 | | | | | | | | | | 16,325.0 | 12,336.0 | 8,479.0 |
| 20 | | | | | | | | | | 14,027.0 | 8,110.0 | 8480 |
| 21 | | | | | | | | | | 12,706.0 | 9695 | 11,941.0 |
| 22 | | | | | | | | | | 11,253.0 | 11,517.0 | 11,941.0 |
| 23 | | | | | | | | | | 5,257.0 | 11,465.0 | 8,031.0 |
| 24 | | | | | | | | | | 8,638.0 | 14,714.0 | 7,714.0 |
| 25 | | | | | | | | | | 14,186.0 | 15,718.0 | 8,612.0 |
| 26 | | | | | | | | | | 9,537.0 | 8,797.0 | 7,238.0 |
| 27 | | | | | | | | | | 9,801.0 | 12,205.0 | 12,046.0 |
| 28 | | | | | | | | | | 12,363.0 | 11,861.0 | 15,269.0 |
| 29 | | | | | | | | | | 11,941.0 | 10,250.0 | 10,197.0 |
| 30 | | | | | | | | | | 11,650.0 | 9,590.0 | 5,389.0 |
| 31 | | | | | | | | | | 11,756.0 | | 10,514.0 |
| Total | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| Average | NA | NA | NA | NA | NA | NA | NA | NA | NA | 12828 | 11154 | 10529 |
| Maximum | NA | NA | NA | NA | NA | NA | NA | NA | NA | 16325 | 15718 | 19815 |

| | | |
|---|---|---|
| 2017 Maximum Daily Fuel Rate | 19815 | gallons |
| 2017 Max Avg Daily Fuel Rate | 12828 | gallons |

| SUMMARY | 2013 | 2014 | 2015 | 2016 | 2017 | ALL |
|---|---|---|---|---|---|---|
| **Annual Average Daily** | 11,012 | 11,379 | 14,182 | 10,254 | 12,828 | **14,182** |
| **Annual Max Daily Fuel Rate** | 20,605 | 23,353 | 28,319 | 14,070 | 19,815 | **28,319** |

| | WEST CAPRICORN - 2016 ACTUAL FUEL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Volume Consumed in Gallons | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | st Capricor | 9539 | 6050 | 7687 | | | | | | | | |
| 2 | 10065 | 9438 | 7555 | 9214 | | | | | | | | |
| 3 | 11042 | 9438 | 7053 | 7423 | | | | | | | | |
| 4 | 11148 | 9872 | 7199 | 7061 | | | | | | | | |
| 5 | 12152 | 8997 | 6903 | 6974 | | | | | | | | |
| 6 | 11571 | 10937 | 6229 | 7119 | | | | | | | | |
| 7 | 9378 | 9932 | 7740 | 6921 | | | | | | | | |
| 8 | 8850 | 10066 | 13430 | 6287 | | | | | | | | |
| 9 | 9933 | 12033 | 9415 | 6921 | | | | | | | | |
| 10 | 6789 | 7159 | 9774 | 7291 | | | | | | | | |
| 11 | 9272 | 10672 | 9045 | 5928 | | | | | | | | |
| 12 | 9484 | 7830 | 8731 | 6552 | | | | | | | | |
| 13 | 10189 | 10131 | 9027 | 7027 | | | | | | | | |
| 14 | 9669 | 10128 | 11462 | 7915 | | | | | | | | |
| 15 | 7936 | 9323 | 7233 | 8189 | | | | | | | | |
| 16 | 11341 | 13053 | 7394 | 8913 | | | | | | | | |
| 17 | 9920 | 9164 | 6995 | | | | | | | | | |
| 18 | 10276 | 9035 | 8691 | | | | | | | | | |
| 19 | 11993 | 9127 | 8337 | | | | | | | | | |
| 20 | 12218 | 8580 | 8374 | | | | | | | | | |
| 21 | 14070 | 10398 | 8638 | | | | | | | | | |
| 22 | 13129 | 10144 | 7503 | | | | | | | | | |
| 23 | 10546 | 8403 | 5183 | | | | | | | | | |
| 24 | 10432 | 10620 | 11333 | | | | | | | | | |
| 25 | 9566 | 8221 | 7267 | | | | | | | | | |
| 26 | 9251 | 7027 | 7896 | | | | | | | | | |
| 27 | 10247 | 7080 | 8752 | | | | | | | | | |
| 28 | 9140 | 6684 | 8174 | | | | | | | | | |
| 29 | 9436 | 6684 | 7582 | | | | | | | | | |
| 30 | 9497 | | 9051 | | | | | | | | | |
| 31 | 9087 | | 7680 | | | | | | | | | |
| Total | 307627 | 269715 | 255696 | 117422 | NA | NA | NA | NA | NA | NA | NA | NA |
| Average | 10254 | 9301 | 8248 | 7339 | NA | NA | NA | NA | NA | NA | NA | NA |
| Maximum | 14070 | 13053 | 13430 | 9214 | NA | NA | NA | NA | NA | NA | NA | NA |

NO BPXP RELATED WEST CAPRICORN OPERATIONS

| | | |
|---|---|---|
| 2016 Maximum Daily Fuel Rate | 14070 | gallons |
| 2016 Max Avg Daily Fuel Rate | 10254 | gallons |

| | WEST CAPRICORN - 2015 ACTUAL FUEL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Volume Consumed in Gallons | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | st Capricor | 9537 | 11492 | 9695 | 9669 | 9827 | 10514 | 23749 | 7423 | 10434 | 9589 | 9986 |
| 2 | 10197 | 9484 | 11967 | 12575 | 9246 | 9193 | 9405 | 11967 | | 9351 | 9933 | 9933 |
| 3 | 13843 | 10139 | 10831 | 10567 | 9510 | 9325 | 6050 | 17013 | 9510 | | 9932 | 9405 |
| 4 | 11571 | 13232 | 11861 | 9246 | 9378 | 616 | 10224 | 22164 | 7212 | 9932 | 10038 | 9008 |
| 5 | 11175 | 11042 | 10091 | 9378 | 10171 | 9457 | 10567 | 23802 | 7080 | 8559 | 10804 | 12495 |
| 6 | 12760 | 12495 | 13235 | 9827 | 9299 | 9484 | 10514 | 28319 | 6710 | 9853 | 11086 | 13895 |
| 7 | 13182 | 10699 | 14028 | 11175 | 5917 | 10963 | 9616 | 26919 | 7661 | 9193 | 10767 | 5416 |
| 8 | 13711 | 20658 | 10646 | 14239 | 9695 | 13473 | 10065 | 24383 | 7000 | 9589 | 22877 | 8506 |
| 9 | 13182 | 12310 | 12601 | 10038 | 8929 | 12680 | 9087 | 25176 | 8030 | 9325 | 25334 | 10541 |
| 10 | 9933 | 13367 | 9457 | 10118 | 9167 | 12654 | 8295 | 20790 | 7819 | 9985 | 25598 | 10356 |
| 11 | 9140 | 9299 | 10963 | 1005 | 10593 | 8057 | 9642 | 17673 | 7661 | 9615 | 12680 | 10091 |
| 12 | 11993 | 6763 | 10065 | 11148 | 9933 | 8955 | 9484 | 16379 | 7529 | 9615 | 13789 | 20685 |
| 13 | 12627 | 18360 | 13710 | 10646 | 8401 | 9405 | 9801 | 18703 | 7846 | 9193 | 9404 | 14952 |
| 14 | 14265 | 6789 | 9827 | 10435 | 6802 | 8955 | 9008 | 11941 | 7793 | 10224 | 9932 | 17464 |
| 15 | 11307 | 19099 | 9774 | 9484 | 12152 | 10091 | 10171 | 16009 | 8665 | 1224 | 9589 | 14054 |
| 16 | 10673 | 10012 | 12575 | 9431 | 9774 | 10090 | 10593 | 2559 | 8533 | 9246 | 12865 | 13287 |
| 17 | 10435 | 11122 | 10171 | 10937 | 9907 | 13103 | 10752 | 10408 | 8374 | 10541 | 13129 | 8295 |
| 18 | 10065 | 7793 | 9589 | 10937 | 9589 | 12416 | 11571 | 9642 | 7397 | 9695 | 9430 | 11148 |
| 19 | 10778 | 9827 | 9721 | 15084 | 9259 | 12548 | 9748 | 8612 | 7635 | 10382 | 8717 | 9853 |
| 20 | 9378 | 9642 | 9457 | 15956 | 10197 | 15164 | 9167 | 9299 | 8057 | 9986 | 9644 | 10857 |
| 21 | 9537 | 9748 | 11280 | 15798 | 9933 | 13446 | 9774 | 9959 | 8242 | 9405 | 11253 | 10751 |
| 22 | 11148 | 9801 | 9771 | 14556 | 9352 | 9589 | 7582 | 9695 | 8110 | 9431 | 9087 | 16326 |
| 23 | 17383 | 9193 | 10831 | 15269 | 9933 | 10382 | 11254 | 8137 | 7502 | 9431 | 9563 | 14424 |
| 24 | 15850 | 9589 | 10488 | 13869 | 9907 | 9220 | 9907 | | | 10593 | 9985 | 14424 |
| 25 | 18545 | 10990 | 9140 | 21107 | 9880 | 9801 | 15190 | 7608 | | 9325 | 11335 | 14292 |
| 26 | 13288 | 9246 | 9589 | 17594 | 10012 | 9933 | 14477 | 7344 | | 9774 | 11359 | 9721 |
| 27 | 24410 | 9246 | 15613 | 13763 | 13343 | 9563 | 15375 | 7503 | 11967 | 9695 | 10725 | 11465 |
| 28 | 16537 | 9616 | 3566 | 11280 | 9986 | 10039 | 18915 | 7423 | 11544 | 9933 | 11887 | 10012 |
| 29 | 11552 | | 8348 | 10884 | 9061 | 11439 | 17858 | 6974 | | 10202 | 8506 | 11808 |
| 30 | 9801 | | 9035 | 10197 | 9978 | 11465 | 20870 | 8031 | 9298 | 9220 | 9404 | 11227 |
| 31 | 8348 | | 9405 | | 9616 | | 18307 | 7291 | | 9880 | | 10440 |
| Total | 376614 | 309098 | 329127 | 356238 | 298589 | 311333 | 353783 | 425472 | 204598 | 282831 | 358241 | 365117 |
| Average | 12554 | 11039 | 10617 | 11875 | 9632 | 10378 | 11412 | 14182 | 8184 | 9428 | 11941 | 11778 |
| Maximum | 24410 | 20658 | 15613 | 21107 | 13343 | 15164 | 20870 | 28319 | 11967 | 10593 | 25598 | 20685 |

| | | |
|---|---|---|
| 2015 Maximum Daily | 28319 | gallons |
| 2015 Max Avg Daily Fu | 14182 | gallons |

| | WEST CAPRICORN - 2014 ACTUAL FUEL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Volume consumed in Gallons | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 23353 | 9431 | 10118 | 9405 | 9114 | 8929 | 12178 | 9008 | 9880 | 11571 | 14757 | 10356 |
| 2 | 10541 | 8903 | 10197 | 9854 | 9722 | 8137 | 9933 | | 9193 | 19126 | 12839 | 11439 |
| 3 | 11095 | 12443 | 13658 | 13209 | 9193 | 9563 | 11359 | 9880 | 9140 | 9404 | 8031 | 9510 |
| 4 | 9642 | 9088 | 13684 | 8797 | 9061 | 10250 | 11373 | 10356 | 8665 | 10963 | 8850 | 9854 |
| 5 | 11861 | 9642 | 11492 | 9378 | 9484 | 9787 | 10778 | 11544 | 9563 | 11254 | 9642 | 9352 |
| 6 | 22006 | 9748 | 10065 | 11016 | 9669 | 9801 | 9220 | 10805 | 9114 | 9748 | 8718 | 9774 |
| 7 | 10646 | 9510 | 12680 | 6314 | 8797 | 9484 | 10329 | 11042 | 9748 | 10990 | 9431 | 9774 |
| 8 | 9616 | 9722 | 14028 | 15481 | 9272 | 9484 | 10673 | 10488 | 9352 | 10144 | 10541 | 9695 |
| 9 | 9563 | 9986 | 11544 | 12601 | 9352 | 9352 | 9510 | 11307 | 8876 | 10541 | 10620 | 9299 |
| 10 | 10250 | 9457 | 9616 | 10302 | 9774 | 9431 | 9906 | 9378 | 9352 | 10197 | 15219 | 10118 |
| 11 | 10250 | 9563 | 10250 | 10302 | 9220 | 9035 | 9959 | 8929 | 9774 | 9405 | 13077 | 8612 |
| 12 | 5891 | 10329 | 10804 | 9774 | 9642 | 9439 | 9061 | 11518 | 9722 | 10858 | 10197 | 9061 |
| 13 | 11175 | 10356 | 9721 | 10170 | 10752 | 8744 | 10805 | 13129 | 9484 | 9484 | 9220 | 9378 |
| 14 | 9484 | 9563 | 12812 | 9352 | 9854 | 9906 | 12786 | 11835 | 9167 | 9246 | 9695 | 9352 |
| 15 | 10910 | 9220 | 5574 | 14212 | 10752 | 9510 | 10012 | 13763 | 9299 | 9405 | 9272 | 9061 |
| 16 | 10408 | 9299 | 9959 | 9801 | 8142 | 9441 | 15137 | 15269 | 10012 | 9405 | 11412 | 9537 |
| 17 | 9747 | 9721 | 9959 | 10884 | 10726 | 9441 | 8876 | 13975 | 9827 | 13552 | 13816 | 9220 |
| 18 | 9008 | 9325 | 9642 | 13314 | 9167 | 9537 | 9140 | 10805 | 10593 | 15639 | 14054 | 9959 |
| 19 | 10065 | 9985 | 9167 | 11042 | 8506 | 12205 | 9880 | 12046 | 8295 | 9352 | 14213 | 11095 |
| 20 | 8981 | 9378 | 9378 | 12046 | 9270 | 9405 | 10091 | 11888 | 8269 | 8823 | 13737 | 11077 |
| 21 | 7371 | 10118 | 9325 | 8876 | 8269 | 10303 | 9959 | 13050 | 10250 | 9378 | 13420 | 10144 |
| 22 | 19786 | 9457 | 10488 | 13525 | 8958 | 10197 | 5785 | 13922 | 9457 | 9299 | 11122 | 9669 |
| 23 | 8849 | 9484 | 10091 | 9484 | 8982 | 9008 | 8612 | 13156 | 9193 | 9537 | 9325 | 9880 |
| 24 | 9140 | 8163 | 9193 | 10910 | 10382 | 8955 | 11676 | 15692 | 9431 | 10250 | 9299 | 10224 |
| 25 | 8665 | 8559 | 10673 | 10567 | 9325 | 8665 | 9642 | 13394 | 9986 | 10620 | 7450 | 9140 |
| 26 | 8823 | 10541 | 10593 | 11359 | 9689 | 9167 | 9378 | 11095 | 10699 | 12284 | 8955 | 9537 |
| 27 | 9510 | 9933 | 11676 | 9907 | 10224 | 10567 | 9616 | 10276 | 10329 | 11941 | 8955 | 9616 |
| 28 | 9114 | 9262 | 9669 | 9088 | 9035 | 9352 | 9352 | 10884 | 12073 | 12020 | 9854 | 9933 |
| 29 | 10167 | | 14186 | 9209 | 9167 | 10408 | 9457 | 4121 | 10250 | 10276 | 9959 | 11703 |
| 30 | 9378 | | 12944 | 10393 | 9933 | 9642 | 8955 | 8797 | 10804 | 12337 | 9431 | 9748 |
| 31 | 9299 | | 9986 | | 12020 | | 9061 | 10012 | | 11729 | | 9642 |
| Total | 334594 | 270186 | 333172 | 320572 | 295453 | 287145 | 312499 | 341364 | 289797 | 338778 | 325111 | 304759 |
| Average | 10793 | 9650 | 10747 | 10686 | 9531 | 9572 | 10081 | 11379 | 9660 | 10928 | 10837 | 9831 |
| Maximum | 23353 | 12443 | 14186 | 15481 | 10752 | 12205 | 15137 | 15692 | 12073 | 19126 | 15219 | 11703 |

| | | |
|---|---|---|
| 2014 Maximum Daily Fuel Rate | 23353 | gallons |
| 2014 Max Avg Daily Fuel Rate | 11379 | gallons |

| | WEST CAPRICORN - 2013 ACTUAL FUEL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Volume consumed in Gallons | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | st Capricor | 12284 | 12443 | 14574 | 10540 | 9695 | 9959 | 9880 | | 8030 | 9457 | 9219 |
| 2 | 8110 | 11623 | 16247 | 8039 | 12256 | 9220 | 9642 | 9140 | | 9166 | 9510 | 11016 |
| 3 | 10541 | 11148 | 10488 | 5099 | 17829 | 10065 | 9642 | 10329 | | 11465 | 9747 | 10012 |
| 4 | 11254 | 10303 | 13658 | 5091 | 11764 | 8850 | 10408 | 9616 | 14582 | 9985 | 10699 | 9484 |
| 5 | 10535 | 10419 | 3487 | 7767 | 12884 | 9318 | 12310 | 14503 | 11386 | 10382 | 9351 | 9663 |
| 6 | 8269 | 6382 | 7450 | 7767 | 11624 | 9476 | 11914 | 11016 | 9642 | 11835 | 10012 | 9880 |
| 7 | 10118 | 6789 | 7952 | 13869 | 12337 | 8567 | 13420 | 10408 | 9827 | 9589 | 9909 | 9484 |
| 8 | 10541 | 12839 | 10292 | 16035 | 7740 | 8823 | 11835 | 11465 | 7978 | 10355 | 9957 | 8242 |
| 9 | 11465 | 11095 | 8723 | 10831 | 7740 | 9695 | 11386 | 10461 | 9722 | 9484 | 10356 | 9986 |
| 10 | 6314 | 11095 | 10200 | 12020 | 9140 | 9854 | 11042 | 10091 | 9827 | 11227 | 7727 | 13050 |
| 11 | 7952 | 11328 | 14117 | 14260 | 8982 | 10593 | 9378 | 10620 | 10435 | 10725 | 8955 | 8269 |
| 12 | 9510 | 12337 | 19438 | 8137 | 8427 | 9854 | 9272 | 10303 | 10620 | 10779 | 7714 | 10065 |
| 13 | 9933 | 11803 | 13874 | 7450 | 8903 | 9589 | 9378 | 9986 | 11756 | 10171 | 10699 | 9431 |
| 14 | 7133 | 7069 | 12403 | 7635 | 7767 | 9701 | 9193 | 9616 | 11069 | 10752 | 457 | 10514 |
| 15 | 11412 | 8506 | 10870 | 5363 | 9457 | 10435 | 9642 | 12601 | 11861 | 7978 | 9088 | 12627 |
| 16 | 15454 | 9801 | 9301 | 5653 | 9193 | 10620 | 9563 | 7846 | 13288 | 7529 | 8744 | 8638 |
| 17 | 12178 | 12178 | 14345 | 11254 | 10091 | 10393 | 10329 | 9510 | 11597 | 9615 | 11307 | 9510 |
| 18 | 11201 | 7001 | 12094 | 11875 | 9589 | 10435 | 10593 | 12178 | 12337 | 9616 | 9295 | 9510 |
| 19 | 10573 | 9642 | 12852 | 16743 | 9061 | 12839 | 9299 | 7997 | 12178 | 10567 | 10963 | 9801 |
| 20 | 11941 | 11624 | 11748 | 16873 | 8533 | 12264 | 9510 | 8221 | 12020 | 11095 | 5231 | 9722 |
| 21 | 11808 | 8929 | 8139 | 10805 | 10012 | 12918 | 9748 | 8800 | 10673 | 11042 | 7264 | 9404 |
| 22 | 12469 | 8189 | 8926 | 13777 | 9088 | 9563 | 8955 | 10629 | 10831 | 10884 | 7265 | 10487 |
| 23 | 9880 | 9880 | 12178 | 10963 | 9854 | 11579 | 9484 | 11851 | 10012 | 9880 | 11782 | 10435 |
| 24 | 9801 | 9801 | 8942 | 14099 | 9537 | 9431 | 9669 | 8586 | 10249 | 9740 | 9405 | 9747 |
| 25 | 9325 | 9325 | 11359 | 9246 | 9801 | 10039 | 11042 | 10210 | 11624 | 9431 | 10831 | 10329 |
| 26 | 11122 | 11122 | 11481 | 8771 | 9801 | 8718 | 17832 | 8955 | 9008 | 9642 | 13393 | 8559 |
| 27 | 7555 | 7555 | 15523 | 12527 | 9246 | 9246 | 9722 | 7872 | 9578 | 10778 | 10593 | 9721 |
| 28 | 7933 | 8269 | 12252 | 10834 | 9642 | 9933 | 9220 | 11016 | 11095 | 8638 | 10599 | 8638 |
| 29 | 8269 | | 7106 | 10572 | 9272 | 9695 | 11016 | 9457 | 6762 | 9853 | 8982 | 9061 |
| 30 | 8004 | | 8306 | 9407 | 8321 | 9907 | 9748 | 7186 | 9351 | 10215 | 7872 | 20420 |
| 31 | 8083 | | 5167 | | 8771 | | 9933 | 14080 | | 10118 | | 20605 |
| Total | 298683 | 278336 | 341361 | 317336 | 307202 | 301315 | 324084 | 314429 | 289308 | 310566 | 277164 | 325529 |
| Average | 9956 | 9941 | 11012 | 10578 | 9910 | 10044 | 10454 | 10143 | 10715 | 10018 | 9239 | 10501 |
| Maximum | 15454 | 12839 | 19438 | 16873 | 17829 | 12918 | 17832 | 14503 | 14582 | 11835 | 13393 | 20605 |

| | | |
|---|---|---|
| 2013 Maximum Daily Fuel Rate | 20605 | gallons |
| 2013 Max Avg Daily Fuel Rate | 11012 | gallons |

# WEST CAPRICORN

THE WEST CAPRICORN IS A 6TH GENERATION ULTRA-DEEPWATER SEMI-SUBMERSIBLE DRILLING RIG WITH OPERATIONAL HISTORY IN THE US GULF OF MEXICO

FOR ADDITIONAL INFORMATION PLEASE CONTACT:
SEADRILL MARKETING
WWW.SEADRILL.COM

## GENERAL (U.S.)

**BUILT** ........ 2011 JURONG SHIPYARD SINGAPORE
**DESIGN** ........ FRIEDE & GOLDMAN EXD MILLENIUM
**FLAG / CLASS / NOTATIONS** ........ PANAMA / ABS / A1 COLUMN STABILIZED DRILLING UNIT, AMS, CDS, DPS2, HIMP, CIRCLE E
**DIMENSIONS** ........ 324 FT LONG / 258 FT WIDE
**DRAFTS** ........ 56-65.6 FT DRILLING / 27.9 FT TRANSIT
**DISPLACEMENTS** ........ 50,505-51,117 ST DRILLING 36,772 ST TRANSIT, 41,435 ST @ 39.4 FT DEEP TRANSIT DRAFT
**VARIABLE LOAD** ........ 8,818 ST DRILLING / 6,283 ST TRANSIT
**ACCOMMODATIONS** ........ 180 PERSONS
**HELIDECK** ........ SIKORSKY S-92, EH101
**MAX WATER DEPTH** ........ 10,000 FT DESIGNED / 10,000 FT OUTFITTED
**MAX DRILLING DEPTH** ........ 37,500 FT

## STATION KEEPING

**DYNAMIC POSITIONING** ........ KONGSBERG DP 2
**THRUSTERS** ........ 8X ROLLS ROYCE 4,500 HP AZIMUTHING
**TRANSIT SPEED** ........ UP TO 7 KNOTS
**MOORING LINES** ........ HARBOR MOORING ONLY
**MOORING WINCHES** ........ HARBOR MOORING ONLY

## STORAGE CAPACITIES

**FUEL** ........ 21,599 BBL
**DRILL WATER** ........ 21,600 BBL
**POTABLE WATER** ........ 4,384BBL
**ACTIVE LIQUID MUD** ........ 7,247 BBL
**RESERVE LIQUID MUD** ........ 12,397 BBL
**BULK BENTONITE/BARITE** ........ 11,901 $FT^3$
**BULK CEMENT** ........ 17,163 $FT^3$
**SACK STORAGE (50 LB SACKS)** ........ 6,200 SACKS

## DRILLING PACKAGE

**DERRICK** ........ MARITIME HYDRAULIC 210 FT TALL WITH 46 FT X 52 FT BASE GROSS 2,500,000 LBS
**TOP DRIVE** ........ MH DDM 1000 RATED FOR 1000 ST HOISTING CAPACITY, 2X 1,150 HP AC MOTORS, MAX CONTINUOUS TORQUE 87,020 FT-LBS AT 125 RPM
**DRAWWORKS** ........ WIRTH GH 4500 W/ 2" DRILL LINE MAX LINE PULL 14 LINES OF 2,283,000 LBS
**ROTARY TABLE** ........ WIRTH RTSS 60 ½"
**COMPENSATOR** ........ MH CROWN MOUNTED RATED FOR 1,000,000 LBS COMPENSATED, 2,000,000 LBS STATIC
**TUBULAR HANDLING** ........ MH HI-PRO AUTOMATED RACKING SYSTEM
**OFFLINE CAPABILITY** ........ OFFLINE STAND BUILDING ARM / HRN
**MUD PUMPS** ........ 4X WIRTH TPK 2,200 HP
**HP MUD SYSTEM** ........ RATED FOR 7,500 PSI
**SHALE SHAKERS** ........ 8X DERRICK DP 626

## SUBSEA EQUIPMENT

**BOP** ........ 1X CAMERON 18 ¾" 7 RAM 15,000 PSI
**ANNULAR** ........ 2X CAMERON DL 18 ¾" 10,000 PSI
**DIVERTER** ........ VETCO KFDS CSO 60 ½"
**WELLHEAD CONNECTOR** ........ CAMERON DWHC C-PRO
**RISER** ........ CAMERON LK 75 FT LENGTH 21" OD, 4" ID BOOST LINE
**TENSIONERS** ........ 6X MH DATS MAX TOTAL TENSION APPLIED AT RING 1,800 ST, 50 FT STROKE

## CRANES

**PEDESTAL CRANES** ........ 2 X SEATRAX RATED FOR 116 ST AT 49 FT RADIUS
**PIPE HANDLING CRANE** ........ 1X HYDRAMARINE RATED FOR 10 ST AT 124 FT RADIUS
**X-MAS TREE CRANE** ........ 2X 82 ST, 165 ST TOTAL

## POWER

**MAIN ENGINES** ........ 8X CATERPILLAR C280-16 6,785 HP DIESEL ENGINES
**MAIN GENERATORS** ........ 8X ABB 6,500 HP
**EMERGENCY POWER** ........ 1X CATERPILLAR 3512 B DIESEL ENGINE
........ 1X LEROY SOMER 2,180 HP GENERATOR

## OTHER INFORMATION

**TRIP SAVER** ........ AKMH TRIPSAVER. TEMPORARILY STORE BOP ON TENSIONERS IN MOONPOOL WHILE TOP HOLE IS DRILLED

REVISED 26 AUGUST, 2015

# West Capricorn

The West Capricorn is a 6th generation ultra-deepwater semi-submersible drilling rig with operational history in the US Gulf of Mexico

For additional information please contact:
Seadrill Marketing
www.seadrill.com

## General (Metric)

**Built** ........................................ 2011 Jurong Shipyard Singapore
**Design** ........................................ Friede & Goldman ExD Millenium
**Flag / Class / Notations** ................... Panama / ABS / A1 Column Stabilized Drilling Unit, AMS, CDS, DPS2, HIMP, Circle E
**Dimensions** ........................................ 98.82m long / 78.68 m wide
**Drafts** ........................................ 17-20 m drilling / 8.5 m transit
**Displacements** ........................................ 45,830-46,386 mt drilling 33,368 mt transit, 37,600 MT @ 12m Deep Transit Draft
**Variable load** ...................... 8,000 mt drilling / 5,700 mt transit
**Accommodations** ........................................ 180 Persons
**Helideck** ........................................ Sikorsky S-92, EH101
**Max water depth** ............... 3,048 m designed / 3,048 m outfitted
**Max drilling depth** ........................................ 10,668 m

## Station Keeping

**Dynamic positioning** ........................................ Kongsberg DP 2
**Thrusters** ............................ 8x Rolls Royce 3,300 kw azimuthing
**Transit speed** ........................................ Up to 3.6 m/s
**Mooring lines** ........................................ Harbor mooring only
**Mooring winches** ........................................ Harbor mooring only

## Storage Capacities

**Fuel** ........................................ 3,434 $m^3$
**Drill water** ........................................ 3,501 $m^3$
**Potable water** ........................................ 697 $m^3$
**Active liquid mud** ........................................ 1,152 $m^3$
**Reserve liquid mud** ........................................ 1,971 $m^3$
**Bulk bentonite/barite** ........................................ 337 $m^3$
**Bulk cement** ........................................ 486 $m^3$
**Sack storage** ........................................ 6,200 sacks

## Drilling Package

**Derrick** ........................................ Maritime Hydraulic 64 m tall with 14 m x 16 m base gross 1,133,980 kg
**Top drive** ...................... MH DDM 1000 rated for 907 mt hoisting capacity, 2x 1,150 hp AC motors, max continuous torque 117,983 Nm at 125 RPM
**Drawworks** .............................. Wirth GH 4500 w/ 50.8 mm drill line max line pull 14 lines of 1,036 mt
**Rotary table** ........................................ Wirth RTSS 153.7cm
**Compensator** ................................ MH crown mounted rated for 454 mt compensated, 907 mt static
**Tubular handling** .............. MH Hi-Pro automated racking system
**Offline capability** .................... Offline stand building arm / HRN
**Mud pumps** ........................................ 4x Wirth TPK 1,655 kW
**HP mud system** ........................................ Rated for 517 bar
**Shale shakers** ........................................ 8x Derrick DP 626

## Subsea Equipment

**BOP** ........................................ 1x Cameron 7 ram 1,034 bar
**Annular** ............................... 2x Cameron DL 47.625 cm 689 bar
**Diverter** ........................................ Vetco KFDS CSO 1.5367 m
**Wellhead connector** .............................. Cameron DWHC C-Pro
**Riser** ............................ Cameron LK 22.86 m length 0.5334 m OD 10.16 ID boost line
**Tensioners** ........................................ 6x MH DATs max total tension applied at ring 1,633 mt, 15.24 m stroke

## Cranes

**Pedestal cranes** ...... 2 x Seatrax rated for 105 mt at 15 M radius
**Pipe handling crane** ........................................ 1x Hydramarine rated for 9 mt at 38 m radius
**X-mas tree crane** .................................. 2x 75 mt, 150 mt total

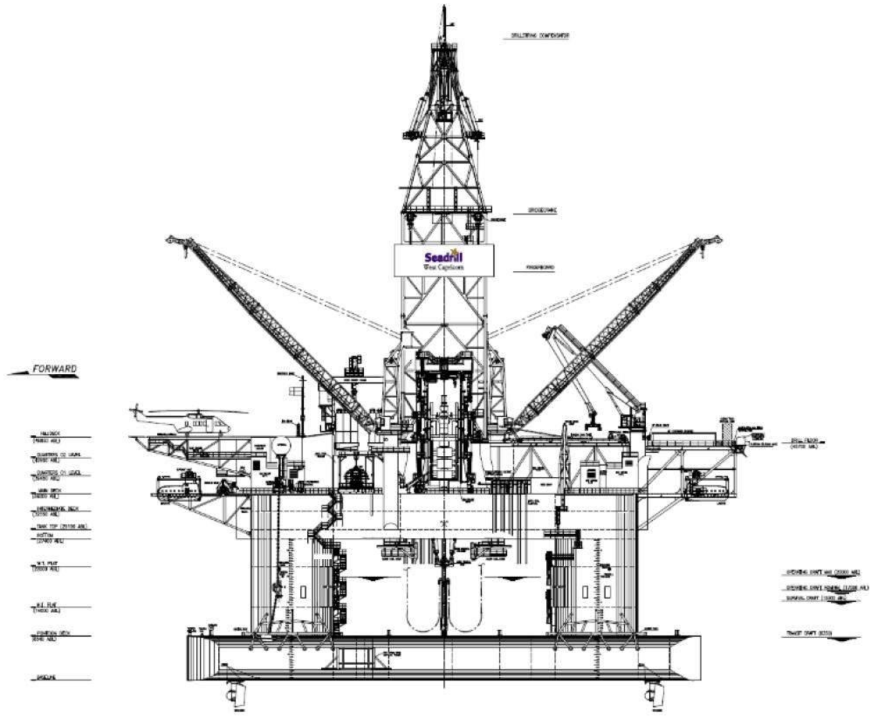
## Power

**Main engines** ..... 8x Caterpillar C280-16 5,060 kW diesel engines
**Main generators** ........................................ 8x ABB 4,800 kW
**Emergency power** .................. 1x Caterpillar 3512 B diesel engine
........................................ 1x Leroy Somer 1,625 kW generator

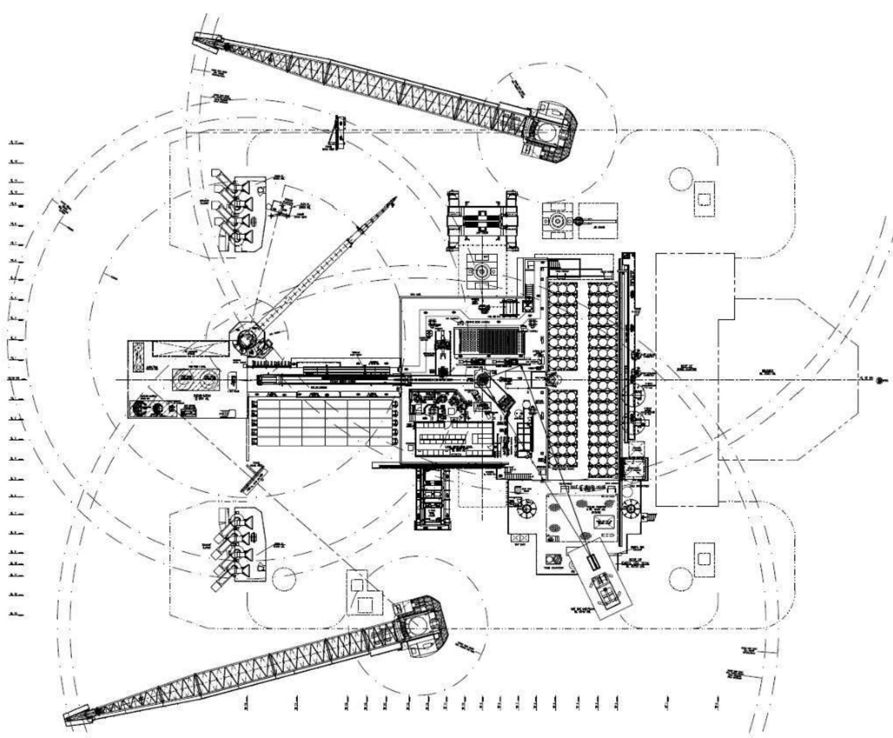
## Other Information

**Trip saver** ................ AKMH Tripsaver. Temporarily store BOP on tensioners in moonpool while top hole is drilled

Revised 26 August, 2015




OUTBOARD PROFILE – PORT VIEW
(LOOKING TO STBD)



DRILL FLOOR PLAN
@ EL. 45700 ABL

## Appendix F: WCD Modeling Report - *Found in Proprietary Copy of EP*

## Appendix G: Oil Spill Response Discussion -

*SPILL RESPONSE DISCUSSION*

1) <u>Worst Case Discharge Scenario</u>

Under this Exploration Plan, BP Exploration & Production Inc. (BP) proposes to drill and complete one (1) well (MC562 002) at primary location 'B'. Surface and bottom hole locations will be in Mississippi Canyon Block 562. The plan also includes a mirror location to the 'B' well referred to as the 'B-1' well. This mirror location ('B-1') is included only for re-spud purposes and ultimately targets the same production horizon. It will encounter the same sands on the path to the targeted bottom-hole location as its respective 'B' well.

2) <u>Facility Information:</u>

- Type of Operation: Drilling and completion
- Facility Name: West Capricorn Rig
- Area and Block: Mississippi Canyon Block 562
- Latitude: 28˚ 26' 37.195"
- Longitude: -88˚ 16' 36.540"
- Distance to Shore: 64.4 statute miles
- Water Depth: Approximately 6,436 ft
- API Gravity: 30.5°
- Total Fuel Oil Storage Capacity (on-board rig): 21,620 bbls

3) <u>Worst Case Discharge Volume</u>

| **Description** | **Barrels of Oil** |
|---|---|
| 24 hour uncontrolled blowout | 170,000 bbls |

BP will make every effort to respond to the Worst Case Discharge as effectively as practicable. A description of the response equipment to contain and recover the Worst Case Discharge is shown in **Figure 4**, which outlines contracted equipment, personnel, materials and support vessels as well as temporary storage equipment to respond to the worst case discharge. The list estimates individual times needed for procurement, load out, travel time to the site, and deployment. **Figure 4** also indicates how operations would be supported.

Using the estimated chemical and physical characteristics of crude oil, an ADIOS weathering model was run on a similar product from the ADIOS oil database. The results indicate 20% or approximately 34,000 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 136,000 barrels remaining.

| **Natural Weathering Data: MC 562, Well Location B** | **Barrels of Oil** |
|---|---|
| WCD Volume | 170,000 |
| *Less* 20% natural evaporation/dispersion | 34,000 |
| Remaining volume | 136,000 |

4) Land Segment and Resource Identification

In compliance with NTL 2012-N06, BP has determined the land areas that could be potentially impacted by a potential oil spill using the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website. The results are shown in **Figure 1** below. The BOEM OSRAM identifies the highest probability of impact to the shorelines of Plaquemines Parish, Louisiana. **Figure 2** contains a list of environmental sensitivities and **Figure 3** contains a list of shoreline types found in Plaquemines Parish.

Plaquemines Parish includes Barataria Bay, the Mississippi River Delta, Breton Sound and the affiliated islands and bays. This region includes sensitive habitat and serves as a migratory, breeding, feeding and nursery habitat for numerous species of wildlife. Beaches in this area vary in grain particle size and can be classified as fine sand, shell or perched shell beaches. Sandy and muddy tidal flats are also abundant.

**FIGURE 1**
**TRAJECTORY BY LAND SEGMENT**

Conditional probabilities of a spill in Mississippi Canyon Block 562 (MC 562) contacting shoreline segments have been projected utilizing BP's WCD and information in the BOEM Oil Spill Risk Analysis Model (OSRAM) (Ji et al., 2004) for the Central and Western Gulf of Mexico available on the BOEM website using 3, 10 ,and 30 day impacts. The results are tabulated below.

| Location | Shoreline Segment | County/Parish, State | Conditional Probability [1](%) | | |
|---|---|---|---|---|---|
| | | | 3 Day | 10 Day | 30 day |
| **MC 562, Well Location B**<br>*64.4 statute miles from shore*<br>OCS-G: G19966<br>Launch Area: C 59 | C13 | Cameron, LA | -- | -- | 1 |
| | C14 | Vermilion, LA | -- | -- | 1 |
| | C17 | Terrebonne, LA | -- | -- | 2 |
| | C18 | Lafourche, LA | -- | 1 | 2 |
| | C19 | Jefferson, LA | -- | -- | 1 |
| | C20 | **Plaquemines, LA** | -- | **5** | **11** |
| | C21 | St. Barnard, LA | -- | -- | 2 |
| | C29 | Walton, FL | -- | -- | 1 |
| | C30 | Bay, FL | -- | -- | 1 |

[1] Conditional probability refers to the probability of contact within the stated time period, assuming that a spill has occurred (-- indicates <0.5%).

**Figure 2 – Environmental Sensitivities**
**Plaquemines Parish, Louisiana**

| Sensitive Areas | Descriptions | Wildlife | Access | Contact |
|---|---|---|---|---|
| **Delta National Wildlife Refuge** | 48,800 acres of marsh, shallow ponds, channels and bayous. Provides a winter sanctuary for migratory waterfowl such as snow geese and more than 18 species of ducks. Also the home of many other water birds and various wildlife species. | **Rare, Threatened, Endangered: Brown pelican, American alligator**<br><br>**Others:**<br>Waterfowl (winter), peregrine falcon, sea birds, shore birds, bass, bream, catfish, crappie, drum, garfish, redfish, speckled trout, flounder, nutria, mink, otter, muskrat, raccoon, white-tailed deer | By boat only. | Delta NWR<br>Bayou Lacombe Centre<br>61389 Hwy 434<br>Lacombe, LA 70445<br>Phone: (985) 882-2000 |
| **Pass A Loutre Wildlife Management Area** | 66,000 acres characterized by river channels with attendant pass banks, natural bayous and man-made canals which are interspersed with intermediate and fresh marshes. Furbearers and alligators are fairly common in the marsh. Freshwater finfish flourish in the interior marsh ponds. | **Rare, Threatened, Endangered: Brown pelican, American alligator**<br><br>**Others:**<br>Waterfowl (winter), peregrine falcon, sea birds, shore birds, bass, bream, catfish, crappie, drum, watermouth, garfish, redfish, speckled trout, flounder, nutria, mink, otter, muskrat, raccoon, white-tailed deer | By boat only, however, the tributaries along the Mississippi River provide excellent traveling passages. The nearest public launches are in Venice. | Pass A Loutre WMA<br>Hammond Field Office<br>42371 Phyllis Ann Drive<br>Hammond, LA 70403<br>Phone: (985) 543-4777 |
| **Breton National Wildlife Refuge** | Breton Island and the adjoining Chandeleur Islands. Breton Island is 2 adjacent islands with a combined length of about 3 miles and a width of less than 1 mile. The Chandeleur Islands have a length of approximately 20 miles and a width of less than 1 mile. The islands are low with sandy beaches on the Gulf side and saltwater marshes on the Chandeleur Sound side. Shoals along the sound side provide wintering habitat for about 20,000 redhead ducks. Nesting colonies of thousands of birds are found on the islands in the summer. Dominant vegetation is black mangrove, groundsel bush and wax murtle. Shallow bay waters around the islands support beds of varying grasses. | **Rare, Threatened, Endangered : Brown pelican, least tern, piping plover**<br><br>**Others:**<br>Redhead ducks and other waterfowl (winter), wading birds, shorebirds and seabirds (including laughing gulls, sandwich terns and black skimmers), finfish | By boat only. Motorized land vehicles are prohibited. | Breton NWR<br>c/o Southeast Louisiana Refuges<br>61389 Highway 434<br>Lacombe, LA 70445<br>Phone: (985) 882-2000 |

Areas of Socio-Economic Concern in Plaquemines Parish:

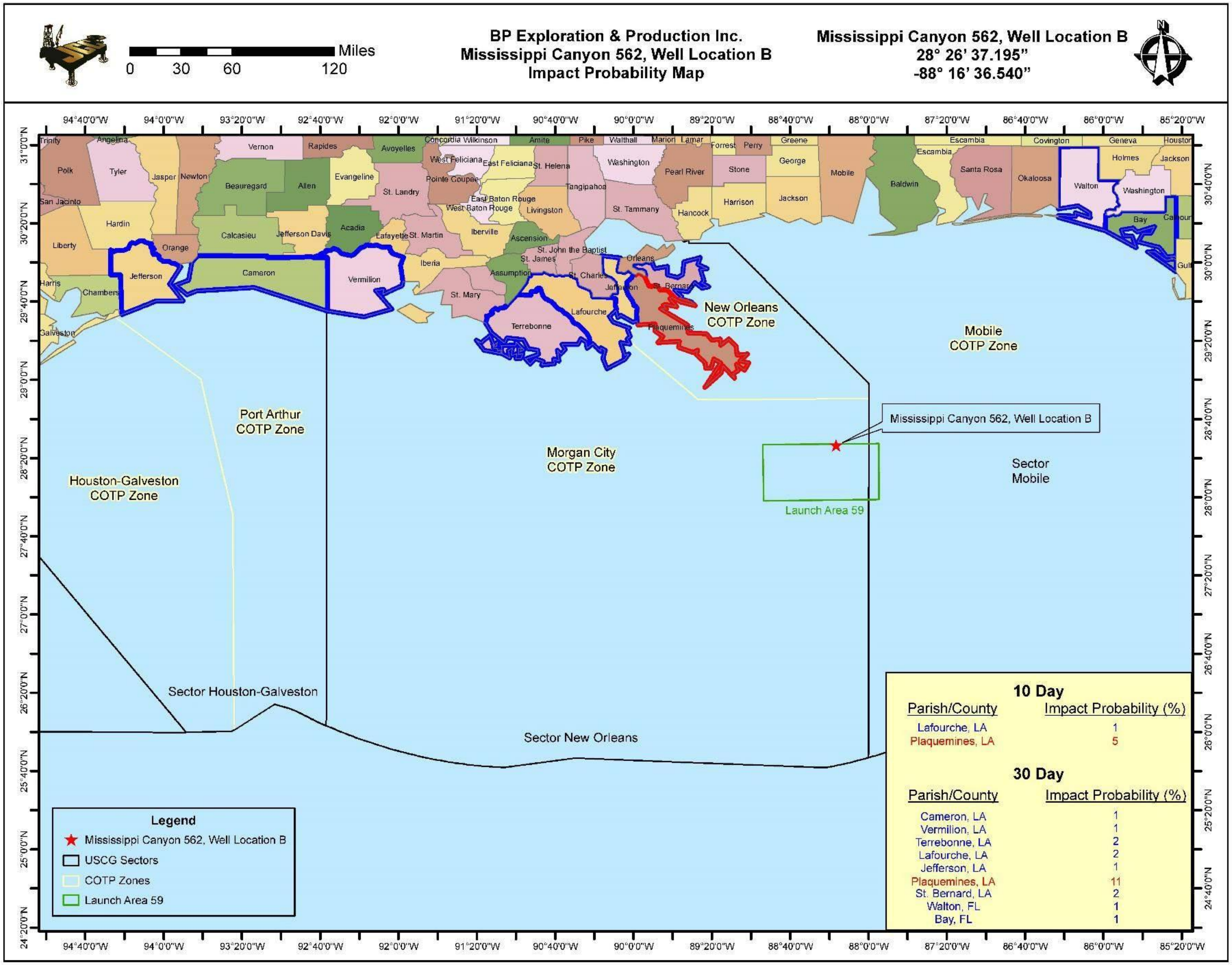
- Commercial fishing routes
  - South Pass
  - Tiger Pass
  - Barataria Waterway

Protection Priorities for Plaquemines Parish:

- Delta National Wildlife Refuge
- Pass-A-Loutre Wildlife Management Area
- Other coastal marshes

**Figure 3**
**Plaquemines Parish – Shorelines**

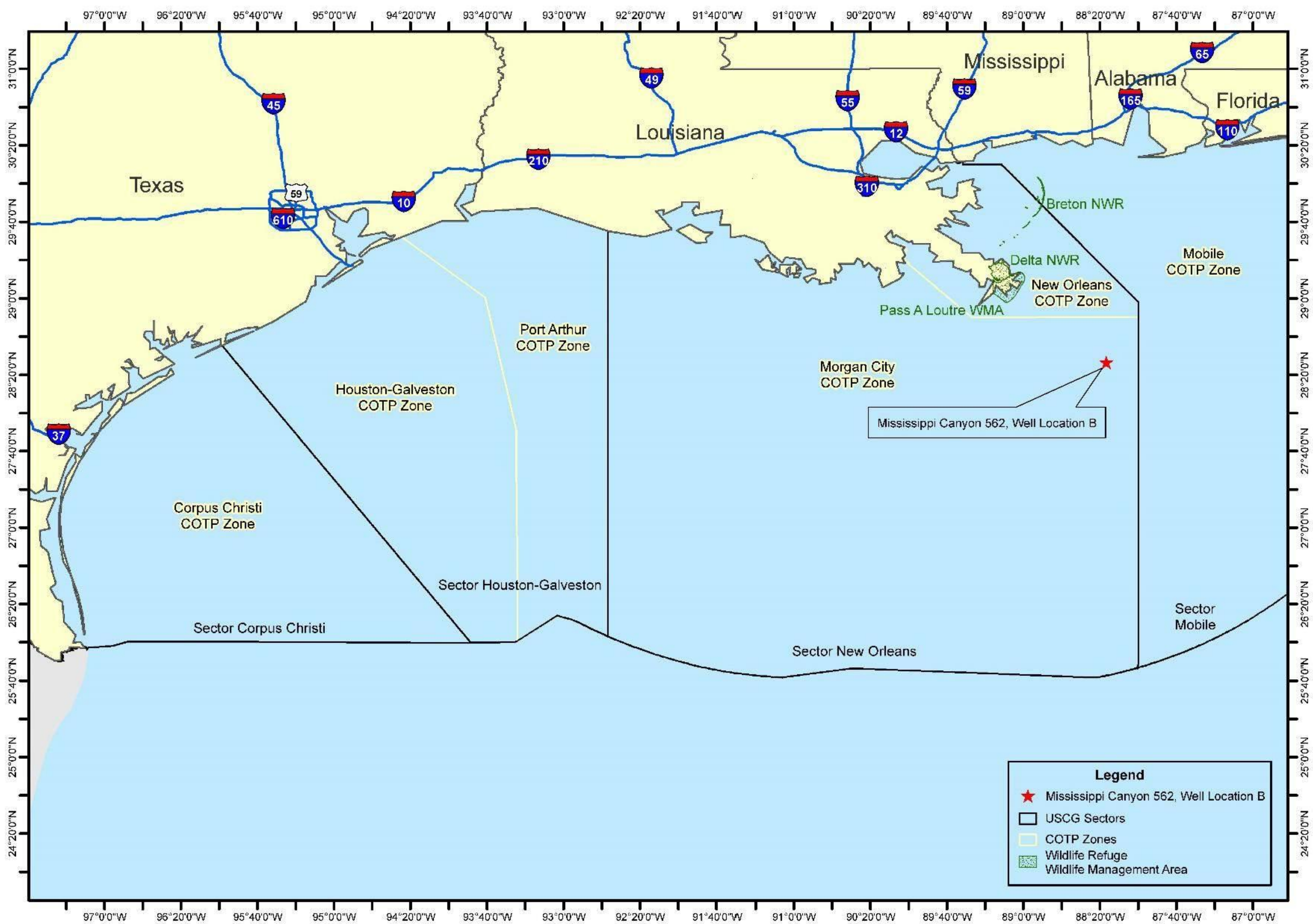
| Shoreline Type | Description |
|---|---|
| **Fine Sand Beaches** | Beaches with low slopes and a grain-size of 0.625 to 0.200 mm. Low percentage of shells and hash. Major fine sand beaches on the delta plain are found at Southwest Pass, Pelican Island and Chandeleur Island. |
| **Perched Shell Beaches** | Shoreline type where a thin shell beach overlies a fresh or salt marsh with an eroded marsh platform outcropping in the surf zone. Organic debris is common to this shoreline type. Where the marsh platform outcrops on the shoreline, it can become re-vegetated by marsh grass. |
| **Shell Beaches** | Shoreline types comprised of almost entirely of shell. Shell material may be in the form of shell hash or whole shells. Shell beaches form extremely steep beach faces. Major shell beaches on the delta plain are found at Point Au Fer and Shell Island. |
| **Muddy Tidal Flats** | Shoreline types comprised of broad intertidal areas consisting of mud and minor amounts of shell hash. The grain-size is smaller than 0.0625 mm. Muddy tidal flats are typically found in association with prograding river mouths. Major muddy tidal flats on the delta plain are found at the Mississippi and Atchafalaya River mouths. |
| **Sandy Tidal Flats** | Shoreline types comprised of broad intertidal areas consisting of fine and coarse grain sand and minor amounts of shell hash. Mean grain size is between 0.0625 and 0.4 mm. Typically found in association with barrier island and tidal inlet systems. This type of flat is submerged during each tidal cycle and at low tide may be 100-200 m wide. Slight changes in water levels can produce significant shoreline changes. Low water levels can expose extensive tidal flat areas to oiling. Major sandy tidal flats on the delta plain are found at Barataria Bay and the Mississippi River mouth. |


BP Exploration & Production Inc.
Mississippi Canyon 562, Well Location B
Impact Probability Map
Mississippi Canyon 562, Well Location B
28° 26' 37.195"
-88° 16' 36.540"
Miles
0 30 60 120
Houston-Galveston COTP Zone
Port Arthur COTP Zone
Morgan City COTP Zone
New Orleans COTP Zone
Mobile COTP Zone
Sector Mobile
Sector Houston-Galveston
Sector New Orleans
Launch Area 59
Mississippi Canyon 562, Well Location B
Legend
Mississippi Canyon 562, Well Location B
USCG Sectors
COTP Zones
Launch Area 59
10 Day
Parish/County Impact Probability (%)
Lafourche, LA 1
Plaquemines, LA 5
30 Day
Parish/County Impact Probability (%)
Cameron, LA 1
Vermilion, LA 1
Terrebonne, LA 2
Lafourche, LA 2
Jefferson, LA 1
Plaquemines, LA 11
St. Bernard, LA 2
Walton, FL 1
Bay, FL 1

BP Exploration & Production Inc.
Mississippi Canyon 562, Well Location B
Wildlife Refuge/Wildlife Management Areas Map
April 2018

Mississippi Canyon 562, Well Location B
28° 26' 37.195"
-88° 16' 36.540"

Miles
0 30 60 120



5) <u>General Considerations for all Oil Spill Recovery Operations</u>

BP will use all appropriate measures possible to safely and efficiently recover oil spilled from its well. These include but are not limited to:

- Conducting detailed safety analyses on response operations and preparing/disseminating resulting safety plans to all response personnel
- Use of tactics described in the most current *MSRC Gulf Area Tactics Guide Book* and *CGA Equipment Guide Book and Tactic Manual* and any other appropriate tactics developed during the event
- Configuring surface recovery systems to achieve maximum throughput and recovery efficiency rates:
    - Maximization of the use of advanced and adverse weather recovery systems to increase oil to recovery system encounter rates
    - Use of vessels with the largest possible onboard recovered oil storage to minimize off-load times
    - Use of appropriate vessels to deploy ocean boom to form the widest practical width to maximize oil to recovery system encounter rate
    - Use of appropriate recovery systems to maximize recovery rate in all operable environmental conditions
- Deployment of CGA, MSRC, and NRCC spill response equipment to recover and store oil while minimizing rig/derig and transit time, maximizing onboard storage and on-station time
- Obtaining approval for decanting of oil to maximize storage capacity
- Use of most efficient, high volume pumps for oil recovery and decanting, offloading and lightering
- Use of advanced technology (such as thermal infrared and multi-spectral cameras) to detect oil on the water's surface and classify it as recoverable or non-recoverable. This will allow more efficient use of on-water recovery task forces, maximize recovery rates and expand operational windows. This advanced technology is effective in both day and night time surveillance activities depending upon atmospheric conditions
- Early consideration of advanced oil removal methods (e.g. dispersant application and in-situ burning) and coordination/consultation with the USCG and appropriate Regional Response Team for obtaining permission to proceed as necessary
- Providing effective communication systems to allow for the command and control of deployed resources to ensure safety, reduce response times, and collect information necessary to develop a comprehensive, timely, and accurate Common Operating Picture (COP)

6) Location Specific Worst Case Discharge Response

BP's Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If the conditions are favorable for dispersant application and/or in-situ burning, once the proper approvals have been obtained and the proper planning is in place, dispersant application and/or in-situ burning of oil may be employed. Slick containment boom will be immediately called out and on scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA, MSRC, and NRCC spill response equipment, with a total derated skimming capacity of 1,371,795 barrels. Temporary storage associated with skimming equipment equals 378,588 barrels. If additional storage is needed, various storage barges with a total capacity of 1.25 million+ barrels may be mobilized and centrally located to provide temporary storage and minimize off-loading time. **Safety is first priority. Air monitoring will be conducted and operations deemed safe prior to the commencement of any containment/skimming operations.**

If the spill went unabated, shoreline impact in Plaquemines Parish, Louisiana will depend upon existing environmental conditions. Shoreline protection will include the use of CGA, MSRC, and NRCC near shore and shallow water skimmers with a total derated skimming capacity of 357,630 barrels. Temporary storage associated with skimming equipment equals 11,050 barrels. If additional storage is needed, various storage barges with a total capacity of 361,000+ barrels may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Onshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. Contracts with AMPOL, MSRC, and NRCC will ensure access to 132,000 feet of 18" shoreline protection boom. **Figure 4** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies will be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), federal and state agencies that oversee and manage some of the resources that may be at risk, and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. BP's Spill Management Team has access to the applicable ACP(s) and GRP(s) Shoreline protection strategies that depict the protection response modes applicable for oil spill clean-up operations. As a secondary resource, the State of Louisiana Initial Oil Spill Response Plan will be consulted as appropriate to provide detailed shoreline protection strategies and describe necessary action to keep the oil spill from entering Louisiana's coastal wetlands. The UC should take into consideration all appropriate items detailed in the Tactics discussion below. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances.

Based on the anticipated worst case discharge scenario, BP can estimate onsite arrival of contracted oil spill recovery equipment with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable*, within approximately 84 hours (based on the equipment's Effective Daily Recovery Capacity (EDRC) and expected travel time to spill site).*

7) Response Strategies

BP will take action to provide a safe, coordinated response to contain and recover spilled oil in a timely manner. Response actions will be designed to provide protection strategies meant to recover oil and protect the responders, the public, wildlife and environmentally sensitive areas. Safety will take precedence over all other considerations during these operations.

Coordination of response assets will be supervised by the designation of a SIMOPS group as necessary for close quarter vessel response activities. Most often, this group will be used during source control events that require a significant number of large vessels operating independently to complete a common objective, in close coordination and support of each other. This group must also monitor the subsurface activities of each vessel (ROV, dispersant application, well control support, etc.).

In addition, these activities will be monitored by the spill management team (SMT) and Unified Command via a structured Common Operating Picture (COP) established to track resource and slick movement in real time.

**Offshore Response**

*Surveillance*

- Aerial Observation:
  - Deployment of surveillance aircraft as soon as possible
  - Trained observer to provide on-site status reports
  - Aerial photography and visual confirmation
- Command and control platform at the site if needed
- Remote Sensing:
  - Use of thermal infrared and multi-spectral sensing systems or other technology to detect oil and classify it as recoverable or non-recoverable to enhance on-water recovery capability
  - Surveillance platforms should be appropriate for weather and atmospheric conditions to provide the greatest altitude (e.g. aircraft, aerostats or ship mounted)
  - Continued surveillance of oil movement by remote sensing systems
- Continuous monitoring of vessel assets using vessel monitoring systems

*Dispersant application*

- Place aerial dispersant providers on standby
- Depending on the scenario, a Modular Subsea Dispersant Application Unit (SDAU) may be ordered and installed at or adjacent to the spill site.
- Conduct analysis to determine appropriateness of dispersant application (refer to Section 18 of approved Oil Spill Response Plan)
- Obtain regulatory approval for use of surface and subsea dispersants
- Confirm dispersant availability for current and long range operations
- Coordinate deployment of a Special Monitoring of Applied Response Technologies (SMART) team as required
- Coordinate movement of dispersants, aircraft, and support equipment and personnel
- Initiate orders for additional dispersant stocks required for expected operations

*Containment boom*

- Call out OSRO boom equipment early and expedite deployment
- Ensure boom handling and mooring equipment is deployed with boom
- Provide continuous reports to vessels to expedite their arrival at sites and provide for most effective containment
- Use support vessels to deploy and maintain boom

*Dedicated off-shore skimming systems*

- Determine if weather conditions allow for skimming operations
- Deployed to the highest concentration of oil
- Assets deployed at safe distance from aerial dispersant and in-situ burn operations
- Deploy OSRO's mechanical recovery equipment such as OSRVs, OSRBs, and VOSS
- Vessels should be organized into task forces or groups with consideration for effective communication and control
- The use of alternative spill surveillance technologies could be used to guide skimming vessels during night time operations

*Storage Vessels*

- Establish availability of contracted assets (See Appendix E of OSRP)
- Early call out (to allow for tug boat acquisition and deployment speeds)
- Phase mobilization to allow storage vessels to arrive with skimming systems
- Position as closely as possible to skimming assets to minimize offloading time

*In-situ Burn Assets*

- Determine appropriateness of in-situ burning in coordination with the FOSC and affected SOSC
- Determine availability of fire boom and selected ignition systems
- Determine assets to perform on-water operations
- Build operations into safety plan
- Initiate orders for additional fire boom stocks required for expected operations
- Conduct initial test burn to ensure effectiveness
- Conduct operations in accordance with an approved plan

*Adverse Weather Operations:*

During adverse weather conditions such as seas being $\geq$ 3 feet, the use of larger recovery and storage vessels, oleophilic skimmers, and large offshore boom will be maximized. Safety will be the overriding factor and operations will cease at the order of the Unified Command or vessel captain. In an emergency, "stop work" may be directed by any crew member.

**Near Shore Response Actions**

*Timing*

- Put near shore assets on standby and deploy in accordance with planning based on the actual situation, real time trajectories and oil budgets
- Support vessel identification and induction training in advance of spill nearing shoreline if possible
- Outfitting of support vessels for specific missions
- Deployment of assets based on actual movement of oil

*Considerations*

- Water depth, vessel draft
- Shoreline gradient
- State of the oil
- Use of support vessels
- Distance of surf zone from shoreline

*Surveillance*

- Provide trained observer to direct skimming operations
- Continuous surveillance of oil movement by remote sensing systems, aerial photography and visual confirmation
- Continuous monitoring of vessel assets

*Dispersant Use*

- Generally will not be approved within 3 miles of shore or with less than 10 meters of water depth
- Approval would be at Regional Response Team level (Region 6) on a case by case basis

**Shoreline Protection Operations**

*Response Planning Considerations*

- Review appropriate Area Contingency Plan(s)
- Locate and review appropriate Geographic Response and Site Specific Plans
- Refer to associated Environmentally Sensitive Area Maps
- Ensure capability of continuous analysis of trajectories run periodically during response
- Order personnel and equipment
- Perform aerial surveillance of oil movement
- Perform Pre-impact beach cleaning and debris removal
- Adhere to Shoreline Cleanup Assessment Team (SCAT) Plans
- Determine requirements and availability of boom types, sizes and lengths
- Consider need for in-situ burning in near shore areas
- Assess current wildlife situation, especially status of migratory birds and endangered species
- Check for archeological sites and arrange assistance for the appropriate state agency when planning operations may impact these areas

*Placement of boom*

- Position boom in accordance with the information gained from references listed above and based on the actual situation
- Determine areas of natural collection and develop booming strategies accordingly
- Assess timing of boom placement based on the most current trajectory analysis and the availability of each type of boom needed. Determine an overall booming priority and conduct booming operations accordingly. Consider:
    - Trajectories
    - Weather forecast
    - Oil impact forecast
    - Verified spill movement
    - Boom, manpower and vessel (shallow draft) availability
    - Near shore boom and support material, (stakes, anchors, line)

*Beach Preparation Considerations and Actions*

- SCAT reports and recommendations
- Monitor tide tables and weather to determine extent of high tides
- Pre-clean beaches by moving waste above high tide lines to minimize waste
- Determine logistical requirements of waste removal and disposal
- Stage equipment and housing of response personnel as close to job site as possible to maximize on-site work time
- Tend to boom, repair, replace and secure as needed (use of local assets may be advantageous)
- Maintain constant awareness of weather and oil movement for resource re-deployment as necessary
- Consider earthen berms and shoreline protection boom to protect sensitive inland areas
- Requisition earth moving equipment
- Plan for efficient and safe use of personnel, ensuring:
- Assess remediation requirements, i.e., replacement of sands, rip rap, etc.
- Ensure availability of surface washing agents and associated protocol requirements for their use (see National Contingency Plan (NCP) Product Schedule for list of possible agents)
- Discuss with all stakeholders, i.e., land owners, refuge/park managers, and others as appropriate, covering the following:
    - Access to areas
    - Katie, what about considering the collection of baseline data (if possible) which links to the Remediation expectations bullet

- Possible response measures and impact of property and ongoing operations
- Determination of any specific safety concerns
- Any special requirements or prohibitions
- Area security requirements
- Handling of waste
- Remediation expectations
- Vehicle traffic control
- Domestic animal safety concerns
- Wildlife or exotic game concerns/issues

*Inland and Coastal Marsh Protection and Response Considerations and Actions*

- All considered response methods will be weighed against the possible damage they may do to the marsh. Methods will be approved by Unified Command only after discussions with local Stakeholder, as identified above
  - In-situ burn may be considered when marshes have been impacted
- Passive clean up of marshes should considered and appropriate stocks of sorbent boom and/or sweep obtained.
- Response personnel must be briefed on methods to traverse the marsh, i.e.,
  - use of appropriate vessel
  - use of temporary walkways or road ways
- Discuss and gain approval prior to cutting or moving vessels through vegetation
- Discuss use of vessels that may disturb wildlife, i.e, airboats
- Ensure safe movement of vessels through narrow cuts and blind curves
- Consider the possibility that no response in a marsh may be best
- In the deployment of any response asset, actions will be taken to ensure the safest, most efficient operations possible. This includes, but is not limited to:
  - Planning for stockage of high use items for expeditious replacement
  - Use of shallow water craft
  - Use of communication systems appropriate ensure command and control of assets
  - Use of appropriate boom in areas that can offer effective protection
  - Planning of waste collection and removal to maximize cleanup efficiency
- Consideration of on-site remediation of contaminated soils to minimize replacement operations and impact on the area

8) Equipment Limitations

The capability for any spill response equipment, whether a dedicated or portable system, to operate in differing weather conditions will be directly in relation to the capabilities of the vessel the system is placed on. Most importantly, however, the decision to operate will be based on the judgment of the Unified Command and/or the Captain of the vessel, who will ultimately have the final say in terminating operations. Skimming equipment listed below may have operational limits which exceed those safety thresholds.

| | |
|---|---|
| Boom | 3 foot seas, 20 knot winds |
| Dispersants | Winds more than 25 knots<br>Visibility less than 3 nautical miles<br>Ceiling less than 1,000 feet. |
| FRU | 8 foot seas |
| HOSS Barge/OSRB | 8 foot seas |
| Koseq Arms | 8 foot seas |
| OSRV | 4 foot seas |

9) Environmental Conditions in the GOM

Louisiana is situated between the easterly and westerly wind belts, and therefore experiences westerly winds during the winter and easterly winds in the summer. Average wind speed is generally 14-15 mph along the coast. Wave heights average 4 and 5 feet. However, during hurricane season, Louisiana has recorded wave heights ranging from 40 to 50 feet high and winds reaching speeds of 100 mph. Because much of southern Louisiana lies below sea level, flooding is prominent.

Surface water temperature ranges between 70 and 80 ˚F during the summer months. During the winter, the average temperature will range from 50 and 60 ˚F.

The Atlantic and Gulf of Mexico hurricane season is officially from 1 June to 30 November, and 97% of all tropical activity occurs within this window. The Atlantic basin shows a very peaked season from August through October, with 78% of the tropical storm days, 87% of the minor (Saffir-Simpson Scale categories 1 and 2) hurricane days, and 96% of the major (Saffir-Simpson categories 3, 4 and 5) hurricane days occurring then. Maximum activity is in early to mid September. Once in a few years there may be a hurricane occurring "out of season" - primarily in May or December. Globally, September is the most active month and May is the least active month.

**WCD Scenario– BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS (64.4 statute miles from shore)**
136,000 bbls of crude oil (Volume considering natural weathering)
API Gravity 30.5°

**FIGURE 4 – Equipment Response Time to MC 562, Well Location B**

*Surveillance Aircraft*

| Name/Type | Persons Req. | From | Hrs to Procure | Hrs to Loadout | Travel to site | Total Hrs |
|---|---|---|---|---|---|---|
| ASI (available through contract with CGA) | | | | | | |
| Aero Commander | 2 | Houma, LA | 2 | 2 | 0.9 | 4.9 |
| T&T Marine (available through contract with CGA) | | | | | | |
| CJ3 Citation | 2 | Houston/Galveston, TX | 2 | 2 | 0.9 | 4.9 |

*Dispersant Aircraft*

| Name/Type | Dispersant Capacity (gal) | Persons Req. | From | Hrs to Procure | Hrs to Loadout | Travel to site | Total Hrs |
|---|---|---|---|---|---|---|---|
| ASI (available through contract with CGA) | | | | | | | |
| Basler 67T | 2000 | 2 | Houma, LA | 2 | 2 | 0.9 | 4.9 |
| DC 3 | 1200 | 2 | Houma, LA | 2 | 2 | 1.1 | 5.1 |
| DC 3 | 1200 | 2 | Houma, LA | 2 | 2 | 1.1 | 5.1 |
| MSRC | | | | | | | |
| C-130 Spray AC | 3,250 | 2 | Kiln, MS | 3 | 0 | 0.5 | 3.5 |
| King Air BE90 Spray AC | 250 | 2 | Kiln, MS | 3 | 0 | 0.7 | 3.7 |
| NRCC | | | | | | | |
| Convair 340 (3) | 4500 | 6 | Opa-locka, FL | 2 | 1 | 2.1 | 5.1 |

*Offshore Response*

| Offshore Equipment Pre-Determined Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Required | From | Hrs to Procure | Hrs to Loadout | Hrs to GOM | Travel to Spill Site | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CGA | | | | | | | | | | | |
| 95' FRV | 22885 | 249 | NA | 6 | Leeville, LA | 2 | 0 | 2 | 6 | 1 | 11 |
| 95' FRV | 22885 | 249 | NA | 6 | Venice, LA | 2 | 0 | 3 | 4.5 | 1 | 10.5 |
| 95' FRV | 22885 | 249 | NA | 6 | Vermilion, LA | 2 | 0 | 3 | 13 | 1 | 19 |
| 95' FRV | 22885 | 249 | NA | 6 | Galveston, TX | 2 | 0 | 2 | 20 | 1 | 25 |
| Boom Barge (CGA-300) 42" Auto Boom (25000') | NA | NA | 1 Tug 50 Crew | 4 (Barge) 2 (Per Crew) | Leeville, LA | 8 | 0 | 4 | 18 | 2 | 32 |
| HOSS Barge | 76285 | 4000 | 3 Tugs | 12 | Harvey, LA | 6 | 0 | 12 | 11.5 | 2 | 31.5 |

*Offshore Response, cont'd.*

| Offshore Equipment Pre-determined Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Required | From | Hrs to Procure | Hrs to Loadout | Hrs to GOM | Travel to Spill Site | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MSRC | | | | | | | | | | | |
| Deep Blue Responder<br>LFF 100 Brush + OSRV<br>*2,640' 67" Curtain Pressure Boom* | 18086 | 4000 | NA | 10 | Port Fourchon, LA | 2 | 0 | 1 | 9 | 1 | 13 |
| Florida Responder<br>Transrec 350 + OSRV<br>*2,640' 67" Curtain Pressure Boom* | 10567 | 4000 | NA | 10 | Miami, FL | 2 | 0 | 2 | 42.8 | 1 | 47.8 |
| Gulf Coast Responder<br>Transrec 350 + OSRV<br>*2,640' 67" Curtain Pressure Boom* | 10567 | 4000 | NA | 10 | Lake Charles, LA | 2 | 0 | 4 | 23.3 | 1 | 30.3 |
| Louisiana Responder<br>Transrec 350 + OSRV<br>*2,640' 67" Curtain Pressure Boom* | 10567 | 4000 | NA | 10 | Fort Jackson, LA | 2 | 0 | 4.5 | 8.2 | 1 | 15.7 |
| Mississippi Responder<br>Transrec 350 + OSRV<br>*2,640' 67" Curtain Pressure Boom* | 10567 | 4000 | NA | 10 | Pascagoula, MS | 2 | 0 | 2 | 9.3 | 1 | 14.3 |
| Southern Responder<br>Transrec 350 + OSRV<br>*2,640' 67" Curtain Pressure Boom* | 10567 | 4000 | NA | 10 | Ingleside, TX | 2 | 0 | 1 | 39 | 1 | 43 |
| Texas Responder<br>Transrec 350 + OSRV<br>*2,640' 67" Curtain Pressure Boom* | 10567 | 4000 | NA | 10 | Galveston, TX | 2 | 0 | 1 | 28.6 | 1 | 32.6 |
| MSRC 360 Offshore Barge<br>1 Crucial Disk 88/30<br>*2,640' 67" Curtain Pressure Boom* | 11122 | 36000 | 2 Tugs | 9 | Tampa, FL | 2 | 0 | 2 | 43.8 | 1 | 48.8 |
| MSRC 402 Offshore Barge<br>2 Crucial Disk 88/30<br>*2,640' 67" Curtain Pressure Boom* | 22244 | 40300 | 2 Tugs | 9 | Pascagoula, MS | 2.5 | 0 | 3 | 16.3 | 1 | 22.8 |
| MSRC 403 Offshore Barge<br>1 Crucial Disk 88/30<br>*2,640' 67" Curtain Pressure Boom* | 11122 | 40300 | 2 Tugs | 9 | Ingleside, TX | 2.5 | 0 | 2 | 67.5 | 1 | 73 |
| MSRC 452 Offshore Barge<br>1 Crucial Disk 88/30<br>1 Desmi Ocean<br>*2,640' 67" Curtain Pressure Boom* | 11122<br>3017 | 45000 | 2 Tugs | 9 | Fort Jackson, LA | 2.5 | 0 | 6 | 14.4 | 1 | 23.9 |
| MSRC 570 Offshore Barge<br>2 Crucial Disk 88/30<br>*2,640' 67" Curtain Pressure Boom* | 22244 | 56900 | 2 Tugs | 9 | Galveston, TX | 2.5 | 0 | 2 | 50 | 1 | 55.5 |

*Offshore Response, cont'd.*

| Offshore Equipment Pre-determined Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Required | From | Hrs to Procure | Hrs to Loadout | Hrs to GOM | Travel to Spill Site | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NRCC | | | | | | | | | | | |
| OSRB Defender<br>Marco Class XI AB<br>Vikoma Cascade | 24000<br>5520 | 16500 | 2 Tugs | 4-6 | Bayou La Batre, AL | 4 | 2 | 0 | 18.5 | 1 | 25.5 |
| OSRB Valiant<br>Marco Class XI AB | 24000 | 20892 | 2 Tugs | 4-6 | Aransas Pass, TX | 4 | 2 | 0 | 77 | 1 | 84 |
| OSRB Valor | NA | 19000 | 2 Tugs | 4-6 | Tampa, FL | 4 | 2 | 0 | 50 | 1 | 57 |
| OSRV Admiral<br>Marco Class XI AB<br>8 Band Rope Mop | 24000<br>2283 | 300 | NA | 4-6 | Galveston, TX | 4 | 2 | 0 | 40 | 1 | 47 |
| OSRV Energy<br>Vikoma Sea 50 | 1509 | 300 | NA | 4-6 | Grand Isle, LA | 4 | 2 | 0 | 12 | 1 | 19 |

| Offshore Recovered Oil Storage Pre-determined Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Required | From | Hrs to Procure | Hrs to Loadout | Hrs to GOM | Travel to Spill Site | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Kirby Offshore (available through contract with CGA and/or MSRC) | | | | | | | | | | | |
| RO Barge | NA | 80000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 80000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 100000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 100000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 100000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 100000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 110000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 130000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 140000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 150000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |
| RO Barge | NA | 160000+ | 1 Tug | 6 | Venice, LA | 43.5 | 12 | 4 | 11.5 | 1 | 72 |

**Staging Area: Fourchon**

| Offshore Equipment Preferred Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Req. | From | Hrs to Procure | Hrs to Loadout | Travel to Staging | Travel to Site | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CGA | | | | | | | | | | | |
| FRU (1) + 100 bbl Tank (2) | 4251 | 200 | 1 Utility | 6 | Aransas Pass, TX | 2 | 6 | 17 | 11 | 1 | 37 |
| FRU (1) + 100 bbl Tank (2) | 4251 | 200 | 1 Utility | 6 | Galveston, TX | 2 | 6 | 12 | 11 | 1 | 32 |
| FRU (1) + 100 bbl Tank (2) | 4251 | 200 | 1 Utility | 6 | Lake Charles, LA | 2 | 6 | 7 | 11 | 1 | 27 |
| FRU (2) + 100 bbl Tank (4) | 8502 | 400 | 2 Utility | 12 | Leeville, LA | 2 | 6 | 2 | 11 | 1 | 22 |
| FRU (1) + 100 bbl Tank (2) | 4251 | 200 | 1 Utility | 6 | Morgan City, LA | 2 | 6 | 3 | 11 | 1 | 23 |
| FRU (2) + 100 bbl Tank (4) | 8502 | 400 | 2 Utility | 12 | Venice, LA | 2 | 6 | 5 | 11 | 1 | 25 |
| FRU (1) + 100 bbl Tank (2) | 4251 | 200 | 1 Utility | 6 | Vermilion, LA | 2 | 6 | 5.5 | 11 | 1 | 25.5 |
| 1500' Hydro-Fire Boom | NA | NA | 8 Utility | 40 | Harvey, LA | 0 | 24 | 3 | 11 | 6 | 44 |
| T&T Marine (available through direct contract with CGA) | | | | | | | | | | | |
| Aqua Guard Triton RBS (1) | 22323 | 2000 | 1 Utility | 6 | Galveston, TX | 4 | 12 | 12 | 11 | 2 | 41 |
| Aqua Guard Triton RBS (1) | 22323 | 2000 | 1 Utility | 6 | Harvey, LA | 4 | 12 | 3 | 11 | 2 | 33 |
| Koseq Skimming Arms (10) Lamor brush | 228850 | 10000 | 5 Supply | 30 | Galveston, TX | 24 | 24 | 12 | 11 | 2 | 73 |
| Koseq Skimming Arms (2) Lamor brush | 45770 | 2000 | 1 Supply | 6 | Harvey, LA | 24 | 24 | 3 | 11 | 2 | 64 |
| Koseq Skimming Arms (6) MariFlex 150 HF | 108978 | 6000 | 3 Supply | 18 | Galveston, TX | 24 | 24 | 12 | 11 | 2 | 73 |
| Koseq Skimming Arms (4) MariFlex 150 HF | 72652 | 4000 | 2 Supply | 12 | Harvey, LA | 24 | 24 | 3 | 11 | 2 | 64 |

*Offshore Response, cont'd.*

**Staging Area: Fourchon**

| Offshore Equipment Preferred Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Req. | From | Hrs to Procure | Hrs to Loadout | Travel to Staging | Travel to Site | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MSRC | | | | | | |
| Crucial Disk 56/30 Skimmer (1) | 5671 | 1000 | 1 Utility | 5-9 | Belle Chasse, LA | 1 | 2 | 3 | 22 | 1 | 29 |
| Crucial Disk 56/30 Skimmer (1) | 5671 | 1000 | 1 Utility | 5-9 | Ingleside, TX | 1 | 2 | 17 | 22 | 1 | 43 |
| Crucial Disk 56/30 Skimmer (1) | 5671 | 1000 | 1 Utility | 5-9 | Tampa, FL | 1 | 2 | 22 | 22 | 1 | 48 |
| Crucial Disk 88/30 Skimmer (1)<br>*1,320' 67" Curtain Pressure Boom* | 11122 | 1000 | 1 PSV | 9 | Fort Jackson, LA | 1 | 2 | 5 | 22 | 1 | 31 |
| Crucial Disk 88/30 Skimmer (1)<br>*1,320' 67" Curtain Pressure Boom* | 11122 | 1000 | 1 PSV | 9 | Fort Jackson, LA | 1 | 2 | 5 | 22 | 1 | 31 |
| Desmi Skimmer (1) | 3017 | 1000 | 1 Utility | 5-9 | Lake Charles, LA | 1 | 2 | 7 | 22 | 1 | 33 |
| Desmi Skimmer (1) | 3017 | 1000 | 1 Utility | 5-9 | Miami, FL | 1 | 2 | 28 | 22 | 1 | 54 |
| Foilex 200 Skimmer (1) | 1989 | 1000 | 1 Utility | 5-9 | Belle Chasse, LA | 1 | 2 | 3 | 22 | 1 | 29 |
| Foilex 250 Skimmer (1) | 3977 | 1000 | 1 Utility | 5-9 | Belle Chasse, LA | 1 | 2 | 3 | 22 | 1 | 29 |
| Foilex 250 Skimmer (1) | 3977 | 1000 | 1 Utility | 5-9 | Galveston, TX | 1 | 2 | 12 | 22 | 1 | 38 |
| Foilex 250 Skimmer (1) | 3977 | 1000 | 1 Utility | 5-9 | Ingleside, TX | 1 | 2 | 17 | 22 | 1 | 43 |
| Foilex 250 Skimmer (1) | 3977 | 1000 | 1 Utility | 5-9 | Lake Charles, LA | 1 | 2 | 7 | 22 | 1 | 33 |
| GT-185 Skimmer w Adaptor (1) | 1371 | 1000 | 1 Utility | 5-9 | Baton Rouge, LA | 1 | 2 | 4 | 22 | 1 | 30 |
| GT-185 Skimmer w Adaptor (1) | 1371 | 1000 | 1 Utility | 5-9 | Belle Chasse, LA | 1 | 2 | 3 | 22 | 1 | 29 |
| GT-185 Skimmer w Adaptor (2) | 2742 | 2000 | 2 Utility | 10-18 | Galveston, TX | 1 | 2 | 12 | 22 | 1 | 38 |
| GT-185 Skimmer w Adaptor (1) | 1371 | 1000 | 1 Utility | 5-9 | Ingleside, TX | 1 | 2 | 17 | 22 | 1 | 43 |
| GT-185 Skimmer w Adaptor (1) | 1371 | 1000 | 1 Utility | 5-9 | Lake Charles, LA | 1 | 2 | 7 | 22 | 1 | 33 |
| GT-185 Skimmer w Adaptor (1) | 1371 | 1000 | 1 Utility | 5-9 | Miami, FL | 1 | 2 | 28 | 22 | 1 | 54 |
| GT-185 Skimmer w Adaptor (1) | 1371 | 1000 | 1 Utility | 5-9 | Pascagoula, MS | 1 | 2 | 6 | 22 | 1 | 32 |
| GT-185 Skimmer w Adaptor (1) | 1371 | 1000 | 1 Utility | 5-9 | Port Arthur, TX | 1 | 2 | 9 | 22 | 1 | 35 |
| GT-185 Skimmer w Adaptor (1) | 1371 | 1000 | 1 Utility | 5-9 | Tampa, FL | 1 | 2 | 22 | 22 | 1 | 48 |
| LFF 100 Brush Skimmer (1)<br>*1,320' 67" Curtain Pressure Boom* | 18086 | 1000 | 1 PSV | 9 | Lake Charles, LA | 1 | 2 | 7 | 22 | 1 | 33 |
| LFF 100 Brush Skimmer (1)<br>*1,320' 67" Curtain Pressure Boom* | 18086 | 1000 | 1 PSV | 9 | Lake Charles, LA | 1 | 2 | 7 | 22 | 1 | 33 |
| LFF 100 Brush Skimmer (1)<br>*1,320' 67" Curtain Pressure Boom* | 18086 | 1000 | 1 PSV | 9 | Port Fourchon, LA | 1 | 2 | 0 | 22 | 1 | 26 |
| LFF 100 Brush Skimmer (1)<br>*1,320' 67" Curtain Pressure Boom* | 18086 | 1000 | 1 PSV | 9 | Port Fourchon, LA | 1 | 2 | 0 | 22 | 1 | 26 |

**Staging Area: Fourchon**

| Offshore Equipment Preferred Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Req. | From | Hrs to Procure | Hrs to Loadout | Travel to Staging | Travel to Site | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MSRC | | | | | | | | | | | |
| Stress I Skimmer (1) | 15840 | 1000 | 1 Utility | 5-9 | Belle Chasse, LA | 1 | 2 | 3 | 22 | 1 | 29 |
| Stress I Skimmer (1) | 15840 | 1000 | 1 Utility | 5-9 | Galveston, TX | 1 | 2 | 12 | 22 | 1 | 38 |
| Stress I Skimmer (1) | 15840 | 1000 | 1 Utility | 5-9 | Ingleside, TX | 1 | 2 | 17 | 22 | 1 | 43 |
| Stress I Skimmer (2) | 31680 | 2000 | 2 Utility | 10-18 | Lake Charles, LA | 1 | 2 | 7 | 22 | 1 | 33 |
| Stress I Skimmer (1) | 15840 | 1000 | 1 Utility | 5-9 | Miami, FL | 1 | 2 | 28 | 22 | 1 | 54 |
| Stress I Skimmer (1) | 15840 | 1000 | 1 Utility | 5-9 | Pascagoula, MS | 1 | 2 | 6 | 22 | 1 | 32 |
| Stress I Skimmer (1) | 15840 | 1000 | 1 Utility | 5-9 | Port Fourchon, LA | 1 | 2 | 0 | 22 | 1 | 26 |
| Stress I Skimmer (1) | 15840 | 1000 | 1 Utility | 5-9 | Tampa, FL | 1 | 2 | 22 | 22 | 1 | 48 |
| Stress II Skimmer (1) | 3017 | 1000 | 1 Utility | 5-9 | Pascagoula, MS | 1 | 2 | 6 | 22 | 1 | 32 |
| Transrec 350 Skimmer (1)<br>*1,320' 67" Curtain Pressure Boom* | 10567 | 1000 | 1 PSV | 9 | Houma, LA | 1 | 2 | 2 | 22 | 1 | 28 |
| Transrec 350 Skimmer (1)<br>*1,320' 67" Curtain Pressure Boom* | 10567 | 1000 | 1 PSV | 9 | Lake Charles, LA | 1 | 2 | 7 | 22 | 1 | 33 |
| Walosep W4 Skimmer (1) | 3017 | 1000 | 1 Utility | 5-9 | Belle Chasse, LA | 1 | 2 | 3 | 22 | 1 | 29 |
| Walosep W4 Skimmer (1) | 3017 | 1000 | 1 Utility | 5-9 | Galveston, TX | 1 | 2 | 12 | 22 | 1 | 38 |
| Walosep W4 Skimmer (1) | 3017 | 1000 | 1 Utility | 5-9 | Miami, FL | 1 | 2 | 28 | 22 | 1 | 54 |
| 67" Curtain Pressure Boom (24750') | NA | NA | 7* | 14 | Houston, TX | 1 | 2 | 11 | 22 | 1 | 37 |
| 67" Curtain Pressure Boom (1320') | NA | NA | 2* | 4 | Belle Chasse, LA | 1 | 2 | 3 | 22 | 1 | 29 |
| 67" Curtain Pressure Boom (1305') | NA | NA | 2* | 4 | Pascagoula, MS | 1 | 2 | 6 | 22 | 1 | 32 |
| 1000' Fire Resistant Boom | NA | NA | 3* | 6 | Galveston, TX | 1 | 4 | 12 | 22 | 6 | 45 |
| 2000' Fire Resistant Boom | NA | NA | 3* | 6 | Lake Charles, LA | 1 | 4 | 7 | 22 | 6 | 40 |
| 16000' Fire Resistant Boom | NA | NA | 3* | 6 | Houston, TX | 1 | 4 | 11 | 22 | 6 | 44 |

** Utility Boats, Crew Boats, Supply Boats, or Fishing Vessels*

**Staging Area: Fourchon**

| Offshore Equipment Preferred Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Req. | From | Hrs to Procure | Hrs to Loadout | Travel to Staging | Travel to Site | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NRCC | | | | | | | | | | | |
| 4-Band Rope Mop Skimmer | 1509 | 100 | 1 Offshore Vessel | 4-8 | Ft. Lauderdale, FL | 4 | 4 | 27 | 11 | 1 | 47 |
| 4-Band Rope Mop Skimmer | 1509 | 100 | 1 Offshore Vessel | 4-8 | Mobile, AL | 4 | 4 | 7 | 11 | 1 | 27 |
| 4-Band Rope Mop Skimmer (2) | 3018 | 200 | 1 Offshore Vessel | 8-16 | New Iberia, LA | 4 | 4 | 4 | 11 | 1 | 24 |
| 4-Band Rope Mop Skimmer (2) | 3018 | 200 | 1 Offshore Vessel | 8-16 | Corpus Christi, TX | 4 | 4 | 17 | 11 | 1 | 37 |
| Action 48 Skimmer | 2414 | 100 | 1 Offshore Vessel | 4-8 | Key West, FL | 4 | 4 | 32 | 11 | 1 | 52 |
| Hoyle Disc Skimmer | 1632 | 100 | 1 Offshore Vessel | 4-8 | Tampa, FL | 4 | 4 | 22 | 11 | 1 | 42 |
| Marco Class XI AB | 24000 | 100 | 1 Offshore Vessel | 4-8 | Opa-Locka, FL | 4 | 4 | 27 | 11 | 1 | 47 |
| Marco Class XI AB | 24000 | 100 | 1 Offshore Vessel | 4-8 | New Iberia, LA | 4 | 4 | 4 | 11 | 1 | 24 |
| Marco Class XI AB | 24000 | 100 | 1 Offshore Vessel | 4-8 | Harvey, LA | 4 | 4 | 3 | 11 | 1 | 23 |
| Vikoma Cascade Skimmer | 5520 | 100 | 1 Offshore Vessel | 4-8 | Baytown, TX | 4 | 4 | 10 | 11 | 1 | 30 |
| Vikoma Cascade Skimmer | 5520 | 100 | 1 Offshore Vessel | 4-8 | Sulphur, LA | 4 | 4 | 7 | 11 | 1 | 27 |
| 42" Boom (1000') | NA | NA | 1 Offshore Vessel | 4-8 | Bayou La Batre, AL | 4 | 4 | 6 | 11 | 1 | 26 |
| 42" Boom (2000') | NA | NA | 1 Offshore Vessel | 4-8 | Baytown, TX | 4 | 4 | 10 | 11 | 1 | 30 |
| 42" Boom (4000') | NA | NA | 2 Offshore Vessels | 8-16 | Corpus Christi, TX | 4 | 4 | 17 | 11 | 1 | 37 |
| 42" Boom (1000') | NA | NA | 1 Offshore Vessel | 4-8 | Port Arthur, TX | 4 | 4 | 9 | 11 | 1 | 29 |
| 42" Boom (3300') | NA | NA | 2 Offshore Vessels | 8-16 | Tampa, FL | 4 | 4 | 22 | 11 | 1 | 42 |
| 1000' Hydro-Fire Boom | NA | NA | 6 Utility | 20 | New Iberia, LA | 4 | 4 | 4 | 11 | 1 | 24 |

*Nearshore Response*

| Nearshore Equipment | EDRC | Storage Capacity | Support Vessel(s) | Persons Req. | From | Hrs to Procure | Hrs to Loadout | Hrs to GOM | Travel to Staging | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CGA | | | | | | |
| 46' FRV | 15257 | 65 | NA | 4 | Aransas Pass, TX | 2 | 0 | 2 | 26 | 1 | 31 |
| 46' FRV | 15257 | 65 | NA | 4 | Morgan City, LA | 2 | 0 | 2 | 7 | 1 | 12 |
| 46' FRV | 15257 | 65 | NA | 4 | Lake Charles, LA | 2 | 0 | 2 | 13 | 1 | 18 |
| 46' FRV | 15257 | 65 | NA | 4 | Venice, LA | 2 | 0 | 2 | 2.5 | 1 | 7.5 |
| Trinity SWS | 21500 | 249 | NA | 4 | Aransas Pass, TX | 2 | 0 | NA | 48 | 1 | 51 |
| Trinity SWS | 21500 | 249 | NA | 4 | Morgan City, LA | 2 | 0 | NA | 48 | 1 | 51 |
| Trinity SWS | 21500 | 249 | NA | 4 | Lake Charles, LA | 2 | 0 | NA | 48 | 1 | 51 |
| Trinity SWS | 21500 | 249 | NA | 4 | Vermilion, LA | 2 | 0 | NA | 48 | 1 | 51 |
| | | | | | MSRC | | | | | | |
| 30 ft. Kvichak<br>*Marco I Skimmer (1)* | 3588 | 24 | NA | 6 | Ingleside, TX | 1 | 1 | 2 | 24 | 0 | 28 |
| 30 ft. Kvichak<br>*Marco I Skimmer (1)* | 3588 | 24 | NA | 6 | Galveston, TX | 1 | 1 | 2 | 17.5 | 0 | 21.5 |
| 30 ft. Kvichak<br>*Marco I Skimmer (1)* | 3588 | 24 | NA | 6 | Belle Chasse, LA | 1 | 1 | 2 | 3 | 0 | 7 |
| 30 ft. Kvichak<br>*Marco I Skimmer (1)* | 3588 | 24 | NA | 6 | Pascagoula, MS | 1 | 1 | 2 | 4 | 0 | 8 |
| MSRC Lightning<br>2 LORI Brush Pack | 5000 | 50 | NA | 6 | Tampa. FL | 2 | 0 | 1 | 20 | 1 | 24 |
| MSRC Quick Strike<br>2 LORI Brush Pack | 5000 | 50 | NA | 6 | Lake Charles, LA | 2 | 0 | 1 | 10 | 1 | 14 |
| | | | | | Enterprise Marine (available through contract with CGA) | | | | | | |
| CTCo 2603 | NA | 25000 | 1 Tug | 6 | Amelia, LA | 26 | 12 | 6 | 15 | 1 | 60 |
| CTCo 2604 | NA | 20000 | 1 Tug | 6 | Amelia, LA | 26 | 12 | 6 | 15 | 1 | 60 |
| CTCo 2605 | NA | 20000 | 1 Tug | 6 | Amelia, LA | 26 | 12 | 6 | 15 | 1 | 60 |
| CTCo 2606 | NA | 20000 | 1 Tug | 6 | Amelia, LA | 26 | 12 | 6 | 15 | 1 | 60 |
| CTCo 2607 | NA | 23000 | 1 Tug | 6 | Amelia, LA | 26 | 12 | 6 | 15 | 1 | 60 |
| CTCo 2608 | NA | 23000 | 1 Tug | 6 | Amelia, LA | 26 | 12 | 6 | 15 | 1 | 60 |
| CTCo 2609 | NA | 23000 | 1 Tug | 6 | Amelia, LA | 26 | 12 | 6 | 15 | 1 | 60 |
| CTCo 5001 | NA | 47000 | 1 Tug | 6 | Amelia, LA | 26 | 12 | 6 | 15 | 1 | 60 |
| | | | | | Kirby Offshore (available through contract with CGA and/or MSRC) | | | | | | |
| RO Barge | NA | 80000+ | 1 Tug | 6 | Venice, LA | 48 | 12 | 4 | 7 | 1 | 72 |
| RO Barge | NA | 80000+ | 1 Tug | 6 | Venice, LA | 48 | 12 | 4 | 7 | 1 | 72 |

**Staging Area: Venice**

| Nearshore and Inland Skimmers With Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Req. | From | Hrs to Procure | Hrs to Load Out | Travel to Staging | Travel to Deployment | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CGA | | | | | | | | | | | |
| 2 Drum Skimmer (TDS 118) | 240 | 100 | 1 Crew | 3 | Lake Charles, LA | 2 | 2 | 8 | 2 | 1 | 15 |
| 2 Drum Skimmer (TDS 118) | 240 | 100 | 1 Crew | 3 | Harvey, LA | 2 | 2 | 2 | 2 | 1 | 9 |
| 4 Drum Skimmer (Magnum 100) | 680 | 100 | 1 Crew | 3 | Lake Charles, LA | 2 | 2 | 8 | 2 | 1 | 15 |
| 4 Drum Skimmer (Magnum 100) | 680 | 100 | 1 Crew | 3 | Harvey, LA | 2 | 2 | 2 | 2 | 1 | 9 |
| Foilex Skim Package (TDS 150) | 1131 | 50 | 1 Utility | 3 | Lake Charles, LA | 4 | 12 | 8 | 2 | 2 | 28 |
| Foilex Skim Package (TDS 150) | 1131 | 50 | 1 Utility | 3 | Galveston, TX | 4 | 12 | 13 | 2 | 2 | 33 |
| Foilex Skim Package (TDS 150) | 1131 | 50 | 1 Utility | 3 | Harvey, LA | 4 | 12 | 2 | 2 | 2 | 22 |
| SWS Egmopol | 1810 | 100 | NA | 3 | Galveston, TX | 2 | 2 | 13 | 2 | 1 | 20 |
| SWS Egmopol | 1810 | 100 | NA | 3 | Morgan City, LA | 2 | 2 | 5 | 2 | 1 | 12 |
| SWS Marco | 3588 | 20 | NA | 3 | Lake Charles, LA | 2 | 2 | 8 | 2 | 1 | 15 |
| SWS Marco | 3588 | 34 | NA | 3 | Leeville, LA | 2 | 2 | 5 | 2 | 1 | 12 |
| SWS Marco | 3588 | 34 | NA | 3 | Venice, LA | 2 | 2 | 2 | 2 | 1 | 9 |
| MSRC | | | | | | | | | | | |
| AardVac Skimmer (1) | 3840 | 400 | 1 Utility | 4 | Lake Charles, LA | 1 | 1 | 8 | 2 | 0 | 12 |
| AardVac Skimmer (1) | 3840 | 400 | 1 Utility | 4 | Pascagoula, MS | 1 | 1 | 5.5 | 2 | 0 | 9.5 |
| AardVac Skimmer (2) | 7680 | 800 | 2 Utility | 8 | Miami, FL | 1 | 1 | 27 | 2 | 0 | 31 |
| Queensboro Skimmer (1) | 905 | 400 | 1 Utility | 4 | Galveston, TX | 1 | 1 | 13 | 2 | 0 | 17 |
| Queensboro Skimmer (5) | 4525 | 2000 | 5 Utility | 20 | Lake Charles, LA | 1 | 1 | 8 | 2 | 0 | 12 |
| Queensboro Skimmer (1) | 905 | 400 | 1 Utility | 4 | Belle Chasse, LA | 1 | 1 | 2 | 2 | 0 | 6 |
| Queensboro Skimmer (1) | 905 | 400 | 1 Utility | 4 | Pascagoula, MS | 1 | 1 | 5.5 | 2 | 0 | 9.5 |
| WP 1 Skimmer (1) | 3017 | 400 | 1 Utility | 4 | Ingleside, TX | 1 | 1 | 18 | 2 | 0 | 22 |
| WP 1 Skimmer (1) | 3017 | 400 | 1 Utility | 4 | Pascagoula, MS | 1 | 1 | 5.5 | 2 | 0 | 9.5 |
| WP 1 Skimmer (1) | 3017 | 400 | 1 Utility | 4 | Tampa, FL | 1 | 1 | 21 | 2 | 0 | 25 |
| WP 1 Skimmer (1) | 3017 | 400 | 1 Utility | 4 | Miami, FL | 1 | 1 | 27 | 2 | 0 | 31 |

**Staging Area: Venice**

| Nearshore and Inland Skimmers With Staging | EDRC | Storage Capacity | Support Vessel(s) | Persons Req. | From | Hrs to Procure | Hrs to Load Out | Travel to Staging | Travel to Deployment | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | NRCC | | | | | | |
| Action 24 Skimmer | 823 | 100 | 1 Utility | 4-8 | Baytown, TX | 4 | 4 | 11.5 | 2 | 1 | 22.5 |
| Aqua-Guard RBS-05 Skimmer | 363 | 100 | 1 Utility | 4-8 | Cotulla, TX | 4 | 4 | 20 | 2 | 1 | 31 |
| Crucial Drum Skimmer | 240 | 100 | 1 Utility | 4-8 | Cocoa, FL | 4 | 4 | 22 | 2 | 1 | 33 |
| Crucial ORD Disk Skimmer | 342 | 100 | 1 Utility | 4-8 | Tampa, FL | 4 | 4 | 21 | 2 | 1 | 32 |
| Elastec X-150 Disk Skimmer | 4526 | 100 | 1 Utility | 4-8 | Galveston, TX | 4 | 4 | 13 | 2 | 1 | 24 |
| NRC Weir Disk Skimmer | 1371 | 100 | 1 Utility | 4-8 | Cocoa, FL | 4 | 4 | 22 | 2 | 1 | 33 |
| NRC Weir Disk Skimmer | 1371 | 100 | 1 Utility | 4-8 | Ft. Lauderdale, FL | 4 | 4 | 26 | 2 | 1 | 37 |
| NRC Weir Disk Skimmer | 1371 | 100 | 1 Utility | 4-8 | Pensacola, FL | 4 | 4 | 8 | 2 | 1 | 19 |
| NRC Weir Disk Skimmer | 1371 | 100 | 1 Utility | 4-8 | Tampa, FL | 4 | 4 | 21 | 2 | 1 | 32 |
| NRC Weir Disk Skimmer | 1371 | 100 | 1 Utility | 4-8 | New Iberia, LA | 4 | 4 | 6 | 2 | 1 | 17 |
| NRC Weir Disk Skimmer | 1371 | 100 | 1 Utility | 4-8 | Corpus Christi, TX | 4 | 4 | 18 | 2 | 1 | 29 |
| NRC Weir Disk Skimmer | 1371 | 100 | 1 Utility | 4-8 | Pasadena, TX | 4 | 4 | 12 | 2 | 1 | 23 |
| NRC Weir Disk Skimmer | 1371 | 100 | 1 Utility | 4-8 | Port Arthur, TX | 4 | 4 | 10 | 2 | 1 | 21 |
| Oleophilic Disk Skimmer | 946 | 100 | 1 Utility | 4-8 | Theodore, AL | 4 | 4 | 6 | 2 | 1 | 17 |
| Oleophilic Disk Skimmer | 342 | 100 | 1 Utility | 4-8 | Houston, TX | 4 | 4 | 12 | 2 | 1 | 23 |
| Vikoma Fasflo Skimmer | 2112 | 100 | 1 Utility | 4-8 | Atlantic Beach, FL | 4 | 4 | 18.5 | 2 | 1 | 29.5 |
| Vikoma Fasflo Skimmer | 2112 | 100 | 1 Utility | 4-8 | Panama City Beach, FL | 4 | 4 | 11.5 | 2 | 1 | 22.5 |
| Vikoma Fasflo Skimmer | 2112 | 100 | 1 Utility | 4-8 | Belle Chasse, LA | 4 | 4 | 2 | 2 | 1 | 13 |
| Vikoma Fasflo Skimmer | 2112 | 100 | 1 Utility | 4-8 | New Iberia, LA | 4 | 4 | 6 | 2 | 1 | 17 |
| Vikoma Fasflo Skimmer | 2112 | 100 | 1 Utility | 4-8 | Sulphur, LA | 4 | 4 | 8.5 | 2 | 1 | 19.5 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Atlantic Beach, FL | 4 | 4 | 18.5 | 2 | 1 | 29.5 |
| VTU w/weir head skimmer (2) | 13714 | 48 | 1 Utility | 8-12 | Ft. Lauderdale, FL | 4 | 4 | 26 | 2 | 1 | 37 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Panama City Beach, FL | 4 | 4 | 11.5 | 2 | 1 | 22.5 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Tampa, FL | 4 | 4 | 21 | 2 | 1 | 32 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Harvey, LA | 4 | 4 | 2 | 2 | 1 | 13 |
| VTU w/weir head skimmer (2) | 13714 | 48 | 1 Utility | 8-12 | New Iberia, LA | 4 | 4 | 6 | 2 | 1 | 17 |
| VTU w/weir head skimmer (2) | 13714 | 48 | 1 Utility | 8-12 | Sulphur, LA | 4 | 4 | 8.5 | 2 | 1 | 19.5 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Baytown, TX | 4 | 4 | 11.5 | 2 | 1 | 22.5 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Corpus Christi, TX | 4 | 4 | 18 | 2 | 1 | 29 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Fort Worth, TX | 4 | 4 | 18 | 2 | 1 | 29 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Port Arthur, TX | 4 | 4 | 10 | 2 | 1 | 21 |
| VTU w/weir head skimmer | 6857 | 24 | 1 Utility | 4-8 | Pasadena, TX | 4 | 4 | 12 | 2 | 1 | 23 |

*Shoreline Protection Response*

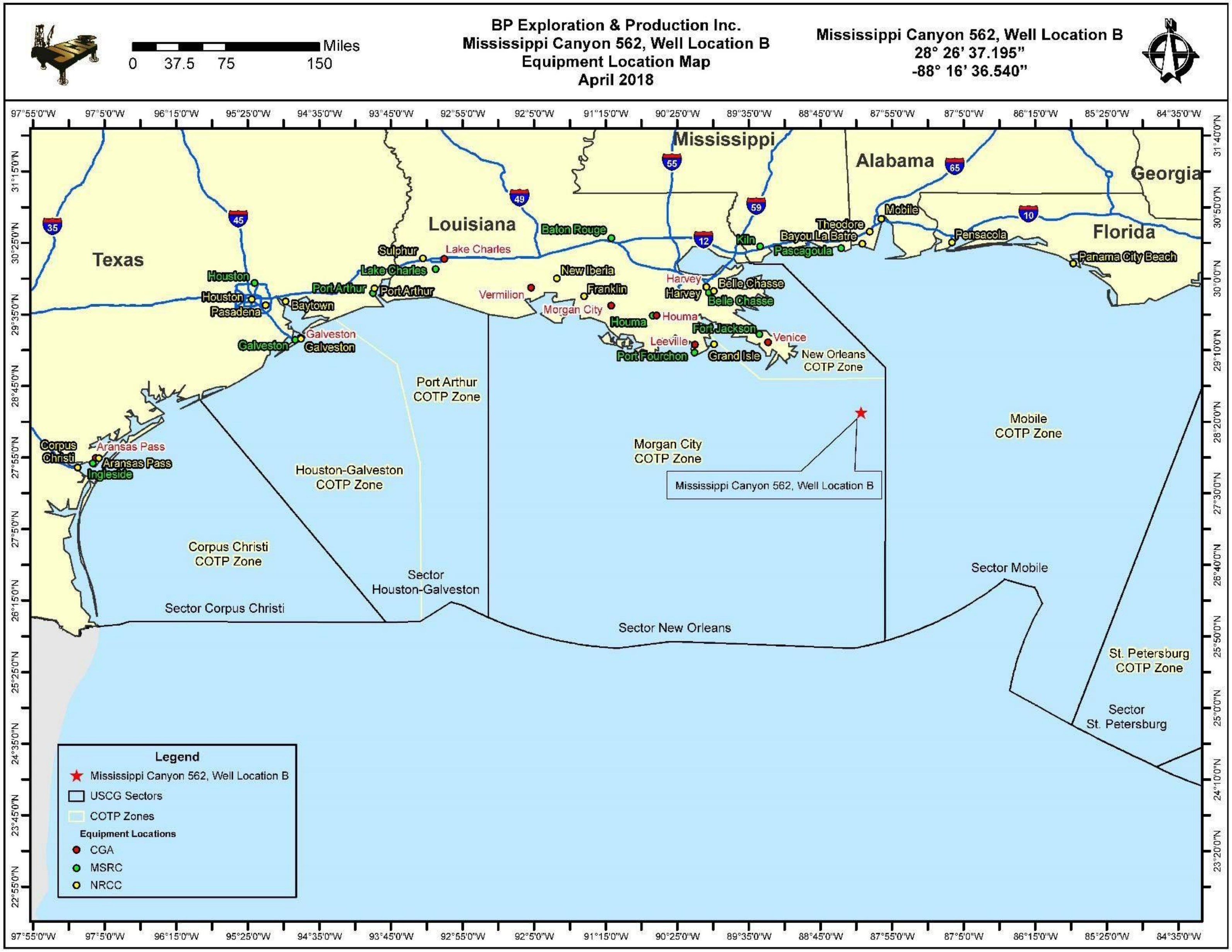
**Staging Area: Venice**

| Shoreline Protection Boom | Support Vessel(s) | Persons Req. | Storage/Warehouse Location | Hrs to Procure | Hrs to Loadout | Travel to Staging | Travel to Deployment | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|
| AMPOL (Available through MSA) | | | | | | | | | |
| 34,050' 18" Boom | 13 Crew | 26 | New Iberia, LA | 2 | 2 | 6 | 2 | 12 | 24 |
| 12,000' 18" Boom | 7 Crew | 14 | Chalmette, LA | 2 | 2 | 2.5 | 2 | 6 | 14.5 |
| 900' 18" Boom | 1 Crew | 2 | Morgan City, LA | 2 | 2 | 4.5 | 2 | 2 | 12.5 |
| 30,000' 18" Boom | 13 Crew | 26 | Harvey, LA | 2 | 2 | 2 | 2 | 12 | 20 |
| 1,700' 18" Boom | 2 Crew | 4 | Venice, LA | 2 | 2 | 0 | 2 | 2 | 8 |
| 16,000' 18" Boom | 7 Crew | 14 | Port Arthur, TX | 2 | 2 | 10 | 2 | 6 | 22 |
| MSRC | | | | | | | | | |
| 6,950' 18" Boom | 3 Crew | 6 | Pascagoula, MS | 1 | 2 | 5.5 | 2 | 1 | 11.5 |
| 2,950' 18" Boom | 3 Crew | 6 | Miami, FL | 1 | 2 | 27 | 2 | 1 | 33 |
| 9,700' 18" Boom | 3 Crew | 6 | Lake Charles, LA | 1 | 2 | 8 | 2 | 1 | 14 |
| NRCC | | | | | | | | | |
| 100' 18" Boom | 2 Crew | 4-8 | Mobile, AL | 4 | 2 | 7 | 2 | 4 | 19 |
| 4,000' 18" Boom | 4 Crew | 8-16 | Cocoa, FL | 4 | 2 | 22 | 2 | 4 | 34 |
| 100' 18" Boom | 2 Crew | 4-8 | Ft. Lauderdale, FL | 4 | 2 | 26 | 2 | 4 | 38 |
| 1,100' 18" Boom | 2 Crew | 4-8 | Key West, FL | 4 | 2 | 31 | 2 | 4 | 43 |
| 2,050' 18" Boom | 2 Crew | 4-5 | Ormond Beach, FL | 4 | 2 | 20 | 2 | 4 | 32 |
| 100' 18" Boom | 2 Crew | 4-8 | Panama City Beach, FL | 4 | 2 | 11.5 | 2 | 4 | 23.5 |
| 4,000' 18" Boom | 4 Crew | 8-16 | Pensacola, FL | 4 | 2 | 8 | 2 | 4 | 20 |
| 100' 18" Boom | 2 Crew | 4-8 | Tampa, FL | 4 | 2 | 21 | 2 | 4 | 33 |
| 6,100' 18" Boom | 6 Crew | 12-24 | New Iberia, LA | 4 | 2 | 6 | 2 | 4 | 18 |
| 100' 18" Boom | 2 Crew | 4-8 | Sulphur, LA | 4 | 2 | 8.5 | 2 | 4 | 20.5 |

*Shoreline Protection Response, cont'd.*

| Wildlife Response | EDRC | Storage Capacity | Support Vessel(s) | Persons Req. | From | Hrs to Procure | Hrs to Loadout | Travel to Staging | Travel to Deployment | Hrs to Deploy | Total Hrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CGA | | | | | | | | | | | |
| Wildlife Support Trailer | NA | NA | NA | 2 | Harvey, LA | 2 | 2 | 2 | 1 | 2 | 9 |
| Bird Scare Guns (48) | NA | NA | NA | 2 | Harvey, LA | 2 | 2 | 2 | 1 | 2 | 9 |
| Bird Scare Guns (12) | NA | NA | NA | 2 | Galveston, TX | 2 | 2 | 13 | 1 | 2 | 20 |
| Bird Scare Guns (12) | NA | NA | NA | 2 | Aransas Pass, TX | 2 | 2 | 18 | 1 | 2 | 25 |
| Bird Scare Guns (24) | NA | NA | NA | 2 | Lake Charles, LA | 2 | 2 | 8 | 1 | 2 | 15 |
| Bird Scare Guns (24) | NA | NA | NA | 2 | Leeville, LA | 2 | 2 | 5 | 1 | 2 | 12 |

| Response Asset Totals | Total (bbls) |
|---|---|
| Offshore EDRC | 1,371,795 |
| Offshore Recovered Oil Storage | 1,628,588+ |
| Nearshore / Shallow Water EDRC | 357,630 |
| Nearshore / Shallow Water Recovered Oil Storage | 372,050+ |



BP Exploration & Production Inc.
Mississippi Canyon 562, Well Location B
Equipment Location Map
April 2018
Mississippi Canyon 562, Well Location B
28° 26' 37.195"
-88° 16' 36.540"
Miles
0 37.5 75 150
Texas
Louisiana
Mississippi
Alabama
Georgia
Florida
Houston
Pasadena
Baytown
Galveston
Port Arthur
Lake Charles
Sulphur
Baton Rouge
New Iberia
Franklin
Vermilion
Morgan City
Houma
Harvey
Belle Chasse
Fort Jackson
Leeville
Port Fourchon
Grand Isle
Venice
Kiln
Pascagoula
Bayou La Batre
Theodore
Mobile
Pensacola
Panama City Beach
Corpus Christi
Aransas Pass
Ingleside
Port Arthur COTP Zone
Houston-Galveston COTP Zone
Corpus Christi COTP Zone
Morgan City COTP Zone
New Orleans COTP Zone
Mobile COTP Zone
St. Petersburg COTP Zone
Sector Corpus Christi
Sector Houston-Galveston
Sector New Orleans
Sector Mobile
Sector St. Petersburg
Mississippi Canyon 562, Well Location B
Legend
Mississippi Canyon 562, Well Location B
USCG Sectors
COTP Zones
Equipment Locations
CGA
MSRC
NRCC

*References*

Ji, Zhen-Gang, Walter R. Johnson, Charles F. Marshall, and Eileen M. Lear. 2004. Oil-Spill Risk Analysis: Contingency Planning Statistics for Gulf of Mexico OCS Activities. OCS Report 2004-026, Herndon, VA: U.S. Dept. of the Interior, Minerals Management Service, Environmental Division.

## Appendix H: Coastal Zone Management Act (CZMA) Consistency Certification –

# Coastal Zone Management Consistency Certification
# State of Louisiana

Revised Exploration Plan
Type of OCS Plan

Mississippi Canyon Block 562
Area and Block

OCS-G 19966
Lease Number

April 2018

CSA-BP-FL-18-80720-3256-02-REP-01-FIN

The proposed activities described in detail in this OCS Plan comply with Louisiana's approved Coastal Management Program and will be conducted in a manner consistent with such Program.

BP
Lessee or Operator

ADALBERTO GARCIA
Certifying Official

4/19/18
Date

# Evaluation of Consistency with the Enforceable Policies of the Louisiana Coastal Resource Program

## 1 Background

BP Exploration & Production Inc. (BP) is submitting a Revised Exploration Plan (EP) to the Bureau of Ocean Energy Management (BOEM). The EP covers the drilling and completion of one well in Mississippi Canyon Block 562 (MC 562). This document evaluates BP's EP for any reasonably foreseeable coastal effects on the land, water uses, or natural resources of the coastal zone of Louisiana, and evaluates the consistency of BP's EP with the enforceable policies of the Louisiana Coastal Resource Program (LCRP). The analysis, compliant with the Coastal Zone Management Act (CZMA), is submitted pursuant to 15 Code of Federal Regulations (CFR) 930.76 and is supported by documentation provided in the Environmental Impact Analysis (EIA). The EIA provides an environmental impacts analysis for the drilling activities based on the location in MC 562 and is included in EP Appendix I. The EIA was prepared in accordance with applicable regulations, including 30 CFR 550.212(o) and 550.227 as well as Notice to Lessees and Operators (NTL) 2008-G04, extended by NTL 2015-N02, and 2015-N01.

The proposed activities will be conducted in accordance with Bureau of Ocean Energy Management (BOEM), Bureau of Safety and Environmental Enforcement (BSEE), and U.S. Environmental Protection Agency (USEPA) regulations, applicable NTLs, conditions in the approved permits, and lease stipulations. All required federal permits will be obtained, and all activities will be conducted in compliance with such regulations, NTLs, conditions, and stipulations.

The proposed activities will occur in Federal Outer Continental Shelf (OCS) waters, approximately 64 statute miles (103 km) from the nearest Louisiana shoreline (**Figure 1**). A dynamically positioned drilling vessel is anticipated to be on site for up to 120 days inclusive of mobilization and demobilization time. It is estimated that drilling activities will occur in 2018.

All land-based support activities, including transport to and from the site, will be from Alabama or Louisiana. No new expansion of facilities or personnel for shorebases is anticipated to result from this exploration project. No significant impacts on the State of Louisiana are expected from routine activities as described in BP's EP.

BP has a system in place to prevent blowouts. BP's response to NTL 2015-N01 is provided in EP Appendix G, which include descriptions of measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout. If a blowout were to occur, BP will implement the plans and procedures of its Regional Oil Spill Response Plan (OSRP), which describes specific response actions for potential spill events and addresses plans and procedures for containment, recovery, and removal of an oil spill. As discussed in Section A.9.2 of the EIA (Large Oil Spill [Worst Case Discharge]), the trajectory of a hypothetical spill in MC 562, projected using information in the 60-day Oil Spill Risk Analysis model for the Gulf of Mexico (see BOEM, 2017), indicates there is up to a 36% conditional probability of a spill contacting any Louisiana shoreline within 60 days of a spill.

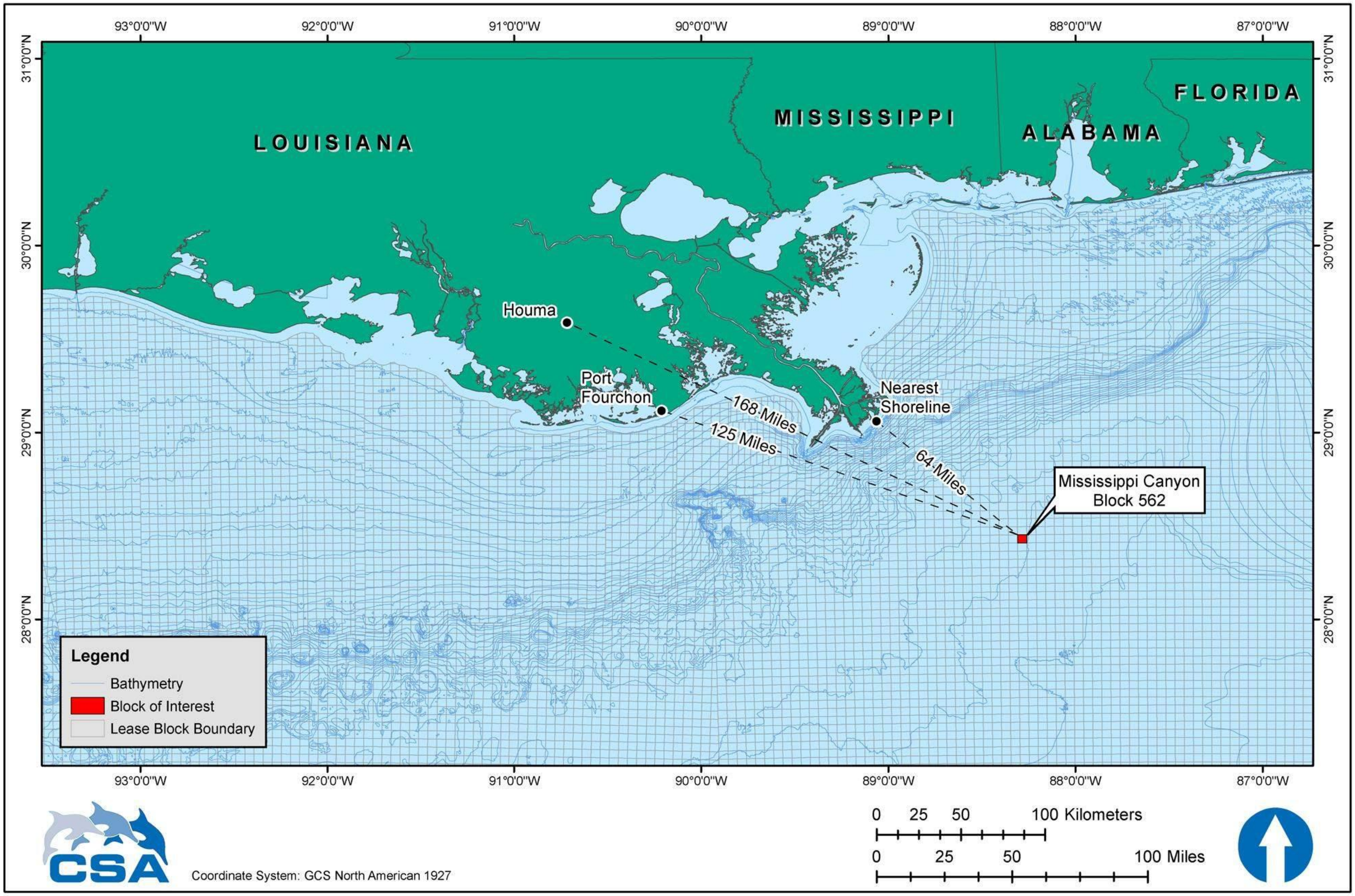



Figure 1. Location of Mississippi Canyon Block 562.

# 2 Louisiana Coastal Resource Program Guidelines

Pursuant to the Louisiana State and Local Resources Management Act of 1978 and as amended (Act 361, La. R.S. 49:214.21 et seq.), the Office of Coastal Management of the Louisiana Department of Natural Resources has created guidelines to implement the LCRP (LAC 43:I.Chapter 7). The guidelines are organized as a set of performance standards that are used to evaluate the impacts of a proposed action on coastal resources. All guidelines applicable to BP's proposed project in MC 562 are summarized below.

### §701. Guidelines Applicable to All Uses

*A.* *The guidelines must be read in their entirety. Any proposed use may be subject to the requirements of more than one guideline or section of guidelines and all applicable guidelines must be complied with.*

The guidelines have been read in their entirety in preparation of this consistency analysis for the MC 562 project, and all applicable guidelines will be complied with.

*B.* *Conformance with applicable water and air quality laws, standards and regulations, and with those other laws, standards and regulations which have been incorporated into the coastal resources program shall be deemed in conformance with the program except to the extent that these guidelines would impose additional requirements.*

Addressed in EP Sections 6 and 7.

*C.* *The guidelines include both general provisions applicable to all uses and specific provisions applicable only to certain types of uses. The general guidelines apply in all situations. The specific guidelines apply only to the situations they address. Specific and general guidelines should be interpreted to be consistent with each other. In the event there is an inconsistency, the specific should prevail.*

The guidelines have been read in their entirety, and all applicable guidelines are summarized and addressed herein.

*F.* *Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines:*

1. *type, nature, and location of use;*
2. *elevation, soil, and water conditions and flood and storm hazard characteristics of site;*
3. *techniques and materials used in construction, operation, and maintenance of use;*
4. *existing drainage patterns and water regimes of surrounding area including flow, circulation, quality, quantity, and salinity; and impacts on them;*
5. *availability of feasible alternative sites or methods of implementing the use;*
6. *designation of the area for certain uses as part of a local program;*
7. *economic need for use and extent of impacts of use on economy of locality;*
8. *extent of resulting public and private benefits;*
9. *extent of coastal water dependency of the use;*

10. *existence of necessary infrastructure to support the use and public costs resulting from use;*
11. *extent of impacts on existing and traditional uses of the area and on future uses for which the area is suited;*
12. *proximity to and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats, and forest lands;*
13. *the extent to which regional, state, and national interests are served including the national interest in resources and the siting of facilities in the coastal zone as identified in the coastal resources program;*
14. *proximity to, and extent of impacts on, special areas, particular areas, or other areas of particular concern of the state program or local programs;*
15. *likelihood of; and extent of impacts of; resulting secondary impacts and cumulative impacts;*
16. *proximity to and extent of impacts on public lands or works, or historic, recreational, or cultural resources;*
17. *extent of impacts on navigation, fishing, public access, and recreational opportunities;*
18. *extent of compatibility with natural and cultural setting; and*
19. *extent of long term benefits or adverse impacts.*

Addressed in EP Sections 1, 5, and 9, and Appendix I.

G. *It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, operated, and maintained to avoid to the maximum extent practicable significant:*

1. *reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow;*
2. *adverse economic impacts on the locality of the use and affected governmental bodies;*
3. *detrimental discharges of inorganic nutrient compounds into coastal waters;*
4. *alterations in the natural concentration of oxygen in coastal waters;*
5. *destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features;*
6. *adverse disruption of existing social patterns;*
7. *alterations of the natural temperature regime of coastal waters;*
8. *detrimental changes in existing salinity regimes;*
9. *detrimental changes in littoral and sediment transport processes;*
10. *adverse effects of cumulative impacts;*
11. *detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging;*

12. *reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest;*
13. *discharges of pathogens or toxic substances into coastal waters;*
14. *adverse alteration or destruction of archaeological, historical, or other cultural resources;*
15. *fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas;*
16. *adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands;*
17. *adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern;*
18. *adverse disruptions of coastal wildlife and fishery migratory patterns;*
19. *land loss, erosion, and subsidence;*
20. *increases in the potential for flood, hurricane and other storm damage, or increases in the likelihood that damage will occur from such hazards; and*
21. *reduction in the long term biological productivity of the coastal ecosystem.*

Addressed in EP Sections 5 and 6, and Appendix I.

*I. Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.*

Addressed in EP Section 1.

## §703. Guidelines for Levees

Not applicable.

## §705. Guidelines for Linear Facilities

Not applicable.

## §707. Guidelines for Dredged Spoil Deposition

Not applicable.

## §709. Guidelines for Shoreline Modification

Not applicable.

## §711. Guidelines for Surface Alterations

Not applicable. Surface alterations to shorebases are not required for this project.

## §713. Guidelines for Hydrologic and Sediment Transport Modifications

Not applicable.

**7§715. Guidelines for Disposal of Wastes**

A. *The location and operation of waste storage, treatment, and disposal facilities shall be avoided in wetlands to the maximum extent practicable, and best practical techniques shall be used to minimize adverse impacts which may result from such use.*

Addressed in EP Sections 6 and 13, and Appendix D.

B. *The generation, transportation, treatment, storage, and disposal of hazardous wastes shall be pursuant to the substantive requirements of the Department of Environmental Quality adopted pursuant to the provisions of R.S. 30:217, et seq.; as amended and approved pursuant to the Resource Conservation and Recovery Act of 1976 P.L. 94-580, as amended, and of the Office of Conservation for injection below surface.*

Addressed in EP Sections 6 and 13, and Appendix D.

C. *Waste facilities located in wetlands shall be designed and built to withstand all expectable adverse conditions without releasing pollutants.*

Not applicable.

D. *Waste facilities shall be designed and constructed using best practical techniques to prevent leaching, control leachate production, and prevent the movement of leachate away from the facility.*

Not applicable.

E. *The use of overland flow systems for nontoxic, biodegradable wastes, and the use of sump lagoons and reservoirs utilizing aquatic vegetation to remove pollutants and nutrients shall be encouraged.*

Not applicable.

F. *All waste disposal sites shall be marked and, to the maximum extent practicable, all components of waste shall be identified.*

Not applicable.

G. *Waste facilities in wetlands with identifiable pollution problems that are not feasible and practical to correct shall be closed and either removed or sealed, and shall be properly revegetated using the best practical techniques.*

Not applicable.

H. *Waste shall be disposed of only at approved disposal sites.*

Addressed in EP Sections 6 and 13, and Appendix D.

I. *Radioactive wastes shall not be temporarily or permanently disposed of in the coastal zone.*

Radioactive wastes are expected during the completion phase of the project and will be addressed in EP Sections 6 and 13, and Appendix D.

## §717. Guidelines for Uses that Result in the Alteration of Waters Draining into Coastal Waters

Not applicable.

## §719. Guidelines for Oil, Gas, and Other Mineral Activities

A. *Geophysical surveying shall utilize the best practical techniques to minimize disturbance or damage to wetlands, fish and wildlife, and other coastal resources.*

Not applicable; all geophysical survey work related to this project was conducted on the OCS in MC 562, approximately 64 miles (103 km) from the nearest Louisiana shoreline. Geological and geophysical information is provided in EP Section 3.

B. *To the maximum extent practicable, the number of mineral exploration and production sites in wetland areas requiring floatation access shall be held to the minimum number, consistent with good recovery and conservation practices and the need for energy development, by directional drilling, multiple use of existing access canals, and other practical techniques.*

Not applicable; all drilling activities related to this project will be conducted on the OCS in MC 562, approximately 64 miles (103 km) from the nearest Louisiana shoreline.

C. *Exploration, production, and refining activities shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Mineral operations in wildlife preserves and management areas shall be conducted in strict accordance with the requirements of the wildlife management body.*

Addressed in EP Sections 1, 5, and 9, and Appendix I. No activities will be conducted in wildlife preserves or management areas. All drilling activities related to this project will be conducted on the OCS in MC 562. Shore-based support may originate from Alabama or Louisiana. The nearest Louisiana shoreline is approximately 64 miles (103 km) from the project area. A selected list of Louisiana Wildlife Refuges, Wilderness Areas, and State and National Parks that could potentially be affected by oiling within 30 days of a large spill, along with the natural resources found in each area, is provided in **Table 1**.

D. *Mineral exploration and production facilities shall be to the maximum extent practicable designed, constructed, and maintained in such a manner to maintain natural water flow regimes, avoid blocking surface drainage, and avoid erosion.*

Not applicable; all drilling activities related to this project will be conducted on the OCS in MC 562, approximately 64 miles (103 km) from the nearest Louisiana shoreline.

E. *Access routes to mineral exploration, production, and refining sites shall be designed and aligned so as to avoid adverse impacts on critical wildlife and vegetation areas to the maximum extent practicable.*

Addressed in EP Sections 12 and 13, and Appendix I.

F. *Drilling and production sites shall be prepared, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment.*

Addressed in EP Sections 1, 2, 8, and 9.

Table 1. Louisiana Wildlife Refuges, Wilderness Areas, State and National Parks, and natural resources within the geographic range of potential shoreline oil contact within 30 days of a large discharge event based on Oil Spill Risk Analysis Launch Point 59 (From: BOEM, 2017).

| Wildlife Refuge, Wilderness Area, State or National Park | Resource Description |
|---|---|
| Cameron Parish | |
| Lacassine NWR | Established in 1937, Lacassine NWR is approximately 35,000 acres of freshwater marsh. Approximately half of the acreage of the NWR is natural freshwater marsh and open water. Notable wildlife includes nesting colonies of wading and water birds, alligators, eagles, falcons, and Louisiana black bears as well as wintering populations of several species of ducks. The NWR is known for vast numbers of pintails congregating each winter. The NWR is available for a multitude of recreational opportunities, including fishing, hunting, boating, and hiking (U.S. Fish and Wildlife Service [USFWS], 2016a). |
| Peveto Woods Bird and Wildlife Sanctuary | A bird sanctuary owned by the Baton Rouge Audubon Society, this sanctuary is a 40-acre tract of coastal land in Cameron Parish. During the spring and fall migrations, the sanctuary is home to numerous species of songbirds. It is estimated that nearly 2 million birds seek refuge in the sanctuary each year before and after their trans-Gulf migrations. The sanctuary is also used by numerous species of butterflies, including the migratory Monarch butterfly (Baton Rouge Audubon Society, 2010). |
| Rockefeller Wildlife Refuge and Game Preserve | Rockefeller Wildlife Refuge, located in eastern Cameron and western Vermilion Parishes, is owned and maintained by the State of Louisiana. The refuge is a flat, treeless area with highly organic soils that are capable of producing immense quantities of waterfowl foods in the form of annual emergents and submerged aquatics. When deeded to the state, the refuge encompassed approximately 86,000 acres, but beach erosion has taken a heavy toll, and the most recent surveys indicate only 76,042 acres remain. This area borders the Gulf of Mexico for 26.5 miles and extends inland toward the Grand Chenier ridge, a stranded beach ridge 6 miles from the Gulf of Mexico. Common resident animals include Mottled Ducks, nutria, muskrat, rails, raccoon, mink, otter, opossum, white-tailed deer, and alligators. An abundant fisheries population provides recreational opportunities to fishermen seeking shrimp, redfish, speckled trout, black drum, and largemouth bass, among others (Louisiana Department of Wildlife and Fisheries, n.d. - a). |
| Sabine NWR | Sabine NWR includes 124,511 acres of fresh, intermediate, and brackish marshes that provide habitat for waterfowl and other birds. Designated as an Internationally Important Bird Area, the refuge is known to provide habitat for more than 300 species of birds, 26 species of mammals, 41 species of reptiles and amphibians, 132 species of fish, and 68 species of marine invertebrates. Common bird species include Mottled Ducks, Great Egrets, Neotropic Cormorants, Snowy Egrets, and various species of wading birds and shorebirds. American alligators are known to be very common in the refuge as well (USFWS, 2016b). |

Table 1. (Continued).

| Wildlife Refuge, Wilderness Area, State or National Park | Resource Description |
|---|---|
| Vermilion Parish | |
| Paul J. Rainey Wildlife Refuge and Game Preserve | Paul J. Rainey Wildlife Refuge and Game Preserve is a privately owned 26,000-acre coastal wetland in Vermilion Parish owned by the National Audubon Society. Formerly open to gas drilling, hydrocarbon exploration ended in 1999. Notable fauna include deer, muskrats, otters, geese, and numerous other species of birds. No hunting or fishing is currently allowed in the Preserve (National Audubon Society, 2017). |
| Rockefeller Wildlife Refuge and Game Preserve | See description under Cameron Parish. |
| State Wildlife Refuge | State Wildlife Refuge is a 13,000-acre tract owned by the State of Louisiana. Located on the southwest shore of Vermilion Bay, the focus of the refuge is on natural resource conservation. The refuge is an important waterfowl wintering area and serves as habitat for numerous species of shorebirds, wading birds, alligators, shrimp, fish, and crabs. Mammals such as raccoons, muskrats, nutria, mink, and deer are common as well (Louisiana Department of Wildlife and Fisheries, n.d. - b). |
| White Lake Wetlands Conservation Area | Located in southwest Vermilion Parish, the area is approximately 72,000 acres of freshwater marsh, cropland, wetlands, wooded areas, and campsites. The marsh areas are managed to provide habitat for wintering waterfowl and other native species (Louisiana Department of Wildlife and Fisheries, n.d. - c). |
| Terrebonne Parish | |
| Isles Dernieres Barrier Islands Refuge | This refuge is made up of three barrier islands offshore of Terrebonne Parish: Wine Island, Whiskey Island, and Raccoon Island, for a total of approximately 630 acres. The primary management goal of the refuge is to provide and protect habitat for nesting waterbirds. Raccoon Island is one of the most important waterbird nesting sites on the Gulf coast (Louisiana Department of Wildlife and Fisheries, n.d. - d). |
| Mandalay NWR | Mandalay NWR was established in 1996 as 4,419 acres of freshwater marsh and cypress-tupelo swamp. Access to the refuge is by boat only. Popular activities in the refuge include wildlife observation, boating, fishing, and hunting. The refuge proves important habitat for wintering waterfowl of the Mississippi flyway. Other notable wildlife include ducks, white tailed deer, alligators, and numerous bird species, including herons, egrets, and eagles (USFWS, 2016c). |
| Point-aux-Chenes WMA | Point-aux-Chenes WMA is a 35,000-acre marshland owned and operated by the Louisiana Department of Wildlife and Fisheries. Access to the WMA typically is limited to boats as there are no roads through the marshland. Notable game species present in the WMA include waterfowl, deer, rabbit, squirrels, rails, gallinules, and snipe. Both saltwater and freshwater fishing in the WMA is considered excellent due to the nearby Timbalier and Terrebonne Bay watersheds. Annual lotteries are held by the Louisiana Department of Wildlife and Fisheries for a waterfowl hunt exclusively for physically challenged hunters and a deer hunt for youth (Louisiana Department of Wildlife and Fisheries, 2016b). |
| Lafourche Parish | |
| Wisner WMA | Owned by the Edward Wisner Donation Advisory Committee, the WMA is approximately 21,000 acres of bayous and canals. The WMA is open seasonally for small game and waterfowl hunting. |
| Point-aux-Chenes WMA | See description under Terrebonne Parish. |
| Jefferson Parish | |
| Grand Isle State Park | Part of the Louisiana State Park system, Grand Isle State Park is a small beach ridge which serves as a breakwater between the Gulf of Mexico and the island channels that connect numerous bayous to the Mississippi River. The park is used extensively for swimming, fishing, boating, camping, and bird watching. Saltwater fishing is especially prolific in the waters offshore of the park, with speckled trout and redfish comprising two of the most popular targets (Louisiana Department of Culture Recreation and Tourism, 2015). |

Table 1. (Continued).

| Wildlife Refuge, Wilderness Area, State or National Park | Resource Description |
|---|---|
| Plaquemines Parish | |
| Delta NWR | The Delta NWR was established in 1935 and covers 49,000 acres formed by the deposition of sediment from the Mississippi River. Its lush vegetation is the food source for a multitude of fish, waterfowl, and animals. The Delta NWR is the winter home for hundreds of thousands of snow geese, coots, and ducks. Endangered and threatened species in the NWR include the Piping Plover and the American alligator, which was de-listed as an endangered species in 1987 but remains listed as threatened due to similarity in appearance to the endangered American crocodile. The Delta NWR supports a wide variety of non-listed wildlife species. Tens of thousands of wintering waterfowl utilize the food resources found in the Delta NWR. Large numbers of other bird species can be found in the NWR, with numbers peaking during the spring and fall migrations. Large numbers of wading birds nest on the refuge, and thousands of shorebirds can be found on tidal mudflats and deltaic splays. Numerous furbearers and game mammals are year-round residents, and the marshes and waterways provide year-round and seasonal habitat for a diversity of fish and shellfish species (USFWS, 2017). |
| Pass-a-Loutre WMA | The Pass-a-Loutre WMA is located in southern Plaquemines Parish at the mouth of the Mississippi River, approximately 10 miles south of Venice, and is accessible only by boat. The area is characterized by river channels with attendant channel banks, natural bayous, and man-made canals interspersed with intermediate and fresh marshes. The area is owned by the Louisiana Department of Wildlife and Fisheries and encompasses approximately 115,000 acres. The area is home to numerous species of shorebirds and other water fowl. Alligators and small mammals are abundant. The inland waters provide habitat for fish, shrimp, and crabs (Louisiana Department of Wildlife and Fisheries, 2016). |
| Breton NWR | Established in 1904, the Breton NWR is the second oldest NWR in the United States. Historically, the Breton NWR has been the site of a lighthouse station (destroyed by Hurricane Katrina), a quarantine station, a small fishing village, and an oil production facility. The Chandeleur Islands are designated as critical habitat for the endangered Piping Plover, which is a common visitor to the refuge during fall, winter, and spring. The Western Gulf Coast population of Brown Pelicans was de-listed under the Endangered Species Act in 2009. The Brown Pelican is a year-round resident of southeast Louisiana, and the Breton NWR serves as important breeding grounds for these birds. The Breton NWR also provides habitat for colonies of nesting wading birds and seabirds as well as wintering shorebirds and waterfowl. Twenty-three species of seabirds and shorebirds frequently use the refuge, and 13 species nest on the various islands. The most abundant nesters are Brown Pelicans, Laughing Gulls, Royal Gulls, and Caspian and Sandwich Terns. Waterfowl winter near the refuge islands and use the adjacent shallows, marshes, and sounds for feeding and for protection during inclement weather. Redheads and Lesser Scaup account for the majority of waterfowl on the refuge. Other wildlife species found in the NWR include nutria, raccoons, and several species of sea turtles (USFWS, 2018). |
| St. Bernard Parish | |
| Breton NWR | See description under Plaquemines Parish. |

NWR = National Wildlife Refuge; WMA=Wildlife Management Area.

G. *All drilling activities, supplies, and equipment shall be kept on barges, on drilling rigs, within ring levees, or on the well site.*

Addressed in EP Section 1.

H. *Drilling ring levees shall to the maximum extent practicable be replaced with small production levees or removed entirely.*

Not applicable; no drilling ring levees will be used during the proposed activities.

I. *All drilling and production equipment, structures, and storage facilities shall be designed and constructed utilizing best practical techniques to withstand all expectable adverse conditions without releasing pollutants.*

Addressed in EP Sections 1 and Appendix I.

J. *Mineral exploration, production, and refining facilities shall be designed and constructed using best practical techniques to minimize adverse environmental impacts.*

Addressed in EP Sections 1 and 2, and Appendix I.

K. *Effective environmental protection and emergency or contingency plans shall be developed and complied with for all mineral operations.*

Addressed in EP Sections 1, 2, 3, and 8, and Appendix I.

L. *The use of dispersants, emulsifiers, and other similar chemical agents on oil spills is prohibited without the prior approval of the Coast Guard or Environmental Protection Agency on-scene coordinator, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan.*

Addressed in Appendix G.

M. *Mineral exploration and production sites shall be cleared, revegetated, detoxified, and otherwise restored as near as practicable to their original condition upon termination of operations to the maximum extent practicable.*

Addressed in EP Sections 1 and Appendices G and I.

N. *The creation of underwater obstructions which adversely affect fishing or navigation shall be avoided to the maximum extent practicable.*

Addressed in EP Section 1.

# 3 Consistency Certification

The analysis indicates that BP's Revised EP for MC 562 is consistent with the enforceable policies of the LCRP according to the guidelines provided by the LCRP. Routine operations will have limited environmental impacts in the immediate vicinity of the drilling activities. Land-based support activities may originate from Alabama and/or Louisiana.

In the event of an accidental spill, BP will implement the measures of its Regional OSRP, which details plans and procedures for containment, recovery, and removal of an oil spill. This project is expected to conform to existing regulatory requirements. The EP describes the project and related activities, and the EIA analyzes potential environmental impacts. The intent and requirements of enforceable Louisiana Statutes have been considered and discussed as well as other information requirements of Louisiana.
A CZMA consistency certification according to 16 U.S.C. 1456(c)(3)(B) and 15 CFR 930.76(c) for Louisiana is provided on the cover page.

# 4 References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Bureau of Ocean Energy Management. 2017. Catastrophic Spill Event Analysis: High-Volume, Extended Duration Oil Spill Resulting from Loss of Well Control on the Gulf of Mexico Outer Continental Shelf. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS Report BOEM 2017-007.

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# Coastal Zone Management Consistency Certification
# State of Alabama

Revised Exploration Plan
Type of OCS Plan

Mississippi Canyon Block 562
Area and Block

OCS-G-19966
Lease Number

April 2018

CSA-BP-FL-18-80720-3256-03-REP-01-FIN

The proposed activities described in detail in this OCS Plan comply with Alabama's approved Coastal Management Program and will be conducted in a manner consistent with such Program.

BP
Lessee or Operator

ADALBERTO GARCIA
Certifying Official

4/19/18
Date

# Evaluation of Consistency with Alabama Enforceable Policies

## 1 Background

BP Exploration & Production Inc. (BP) is submitting a Revised Exploration Plan (EP) to the Bureau of Ocean Energy Management (BOEM). The EP covers the drilling and completion of one well in Mississippi Canyon Block 562 (MC 562). A dynamically positioned drilling vessel is anticipated to be on site for up to 120 days inclusive of mobilization and demobilization time. It is estimated that drilling activities will occur in 2018.

This regulatory analysis and consistency determination evaluates BP's EP for any reasonably foreseeable coastal effects on the land, water uses, or natural resources of the coastal zone of Alabama, pursuant to the enforceable policies of the Alabama Coastal Area Management Program (ACAMP). The analysis is submitted pursuant to 15 Code of Federal Regulations (CFR) 930.76 and is supported by documentation provided in the accompanying Environmental Impact Analysis (EIA) prepared in accordance with applicable regulations, including 30 CFR 550.212(o) and 550.227 as well as Notice to Lessees and Operators (NTL) 2008-G04, extended by NTL 2015-N02, and 2015-N01.

MC 562 is located within the Central Gulf of Mexico Outer Continental Shelf (OCS) Planning Area, approximately 120 miles (193 km) from the nearest Alabama shoreline. BP may use port facilities in Alabama to transport equipment for the project, but BP does not expect the proposed activities to otherwise affect the State of Alabama. The proposed activities will be conducted in accordance with the regulations of BOEM, the Bureau of Safety and Environmental Enforcement, and the U.S. Environmental Protection Agency as well as applicable NTLs, conditions in the approved permits, and lease stipulations.

## 2 Evaluation

**Table 1** evaluates the proposed activities with respect to the enforceable policies of the ACAMP according to 15 CFR 930.76 (b), (c), and (d). The ACAMP was approved and has been in effect since 1979 (National Oceanic and Atmospheric Administration and Alabama Coastal Area Board, 1979), and was most recently updated in 2017 (Alabama Department of Conservation & Natural Resources, 2017). Its purpose is to promote, improve, and safeguard the lands and waters located in Alabama's coastal area through a comprehensive and cooperative program designed to preserve, enhance, and develop these valuable resources for present and future generations. The enforceable policies of the program regulate various activities on coastal lands and waters in Baldwin and Mobile Counties of Alabama.

## 3 Consistency Certification

The analysis indicates that BP's EP for MC 562 is consistent with the guidelines and policies provided by the ACAMP. Routine operations will have limited environmental impacts in the project area. All land-based support activities, including transport to and from the site, will be from Alabama or Louisiana.

Table 1. Evaluation of the Revised Exploration Plan (EP) relative to the enforceable policies of the Alabama Coastal Area Management Program (ACAMP).

| Policy | Cross Reference to the EP | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Coastal Resource Use Policies | | | |
| Coastal Development | EP Section 1 – Plan Contents | Routine activities are not anticipated to affect Alabama's coastal development. The proposed activities will occur in Federal Outer Continental Shelf (OCS) waters approximately 120 miles (193 km) from the nearest Alabama shoreline, and BP will use existing onshore support facilities in Louisiana. Equipment may be shipped to the lease area from Alabama, but no impacts on coastal development are expected. | Yes |
| Mineral Resource Exploration and Extraction | EP Section 1 – Plan Contents | Routine activities are not anticipated to affect mineral resource exploration and extraction in Alabama's coastal zone. The proposed activities will occur in Federal OCS waters approximately 120 miles (193 km) from the nearest Alabama shoreline and do not include any extraction of minerals from the Alabama coastal zone. | Yes |
| Commercial Fishing | EP Section 8 – Oil Spill Information<br>EP Appendix G – Oil Spill Discussion<br>EP Appendix I – EIA (C.8.1 Recreational and Commercial Fishing) | Routine activities are not anticipated to affect commercial fishing in Alabama's coastal zone. Routine activities may have limited environmental impacts in Federal OCS waters, approximately 120 miles (193 km) from the nearest Alabama shoreline.<br>Pelagic longlining activities in the lease area and other commercial fishing activities in the northern Gulf of Mexico, including Alabama's coastal zone, could be interrupted in the event of a large oil spill. A spill may or may not result in fishery closures depending on the duration of the spill, the oceanographic and meteorological conditions at the time, and the effectiveness of spill response measures. The potential impacts of an oil spill on Alabama's coastal zone are analyzed in the EIA. In the event of a spill, BP will implement the plans and procedures of its Regional Oil Spill Response Plan (OSRP). The precautions addressed in BP's standard safety and environmental operating procedures and Regional OSRP are consistent with the protection of Alabama's fishery resources and commercial fishing industry. | Yes |
| Coastal Hazard Management | EP Section 3 – Geological and Geophysical Information<br>EP Appendix G – Oil Spill Discussion<br>EP Appendix I – EIA (D. Environmental Hazards) | Site clearance surveys indicated seafloor conditions are suitable for proposed activities in the lease block.<br>Routine activities are not anticipated to increase the susceptibility of the Alabama's coastal zone to natural hazards due to the location of the proposed activities in Federal OCS waters, approximately 120 miles (193 km) from the nearest Alabama shoreline. Onshore support facilities may be located in Alabama; however, no new development in coastal areas, construction, dredging, or filling on Alabama's lands or waters are anticipated.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize shoreline erosion. | Yes |

Table 1. (Continued).

| Policy | Cross Reference to the EP | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Shoreline Erosion | EP Appendix I – EIA (C.7 Coastal Habitats and Protected Areas) | Routine activities are not anticipated to affect Alabama's shoreline due to the location of the proposed activities in Federal OCS waters, approximately 120 miles (193 km) from the nearest Alabama shoreline. Onshore support facilities may be located in Alabama; however, no new development in coastal areas, construction, dredging, or filling on Alabama's lands or waters are anticipated that could cause shoreline erosion.<br>In the event of a spill, any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize shoreline erosion, as addressed in the Regional OSRP. | Yes |
| Recreation | EP Appendix I – EIA (C.8.4 Recreation and Tourism)<br>EP Appendix G – Oil Spill Discussion | There will be no routine activities in the Alabama coastal zone that could interfere with or diminish public access to coastal lands and waters for recreation. Recreational resources and tourism in coastal areas would not be affected by any routine activities due to the distance from shore. There are no known recreational uses of the lease area. Compliance with NTL BSEE-2015-G03 will minimize the chance of trash or debris being lost overboard and subsequently washing up on beaches.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. The precautions addressed in BP's standard safety and environmental operating procedures and its Regional OSRP are consistent with the ACAMP policy of safeguarding public access to coastal lands and waters for recreation. | Yes |
| Transportation | EP Section 10 – Lease Stipulations Information<br>EP Appendix I – EIA (C.8.6 Other Marine Uses) | Routine activities are not anticipated to affect transportation. The lease area is not located within any United States Coast Guard-designated fairway or shipping lane, or within any Military Warning Area. BP will comply with the Bureau of Ocean Energy Management requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircrafts. Onshore support facilities may be located in Alabama; however, no impacts on Alabama transportation routes or infrastructure are expected to occur. | Yes |
| Natural Resource Protection Policies | | | |
| Biological Productivity | EP Section 6 – Wastes and Discharges Information<br>EP Appendix I – (C.7 Coastal Habitats and Protected Areas)<br>EP Appendix G – Oil Spill Discussion | Routine activities are not anticipated to affect biologically productive coastal habitats, including estuaries. The proposed activities will be conducted in Federal OCS waters approximately 120 miles (193 km) from the nearest Alabama shoreline. BP will potentially use onshore support facilities in Alabama.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. The precautions addressed in BP's standard safety and environmental operating procedures and its Regional OSRP are consistent with the ACAMP policy of protecting and preserving biologically productive coastal habitats. | Yes |

Table 1. (Continued).

| Policy | Cross Reference to the EP | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Water Quality and Water Resources | EP Appendix I – EIA (C.1.2 Water Quality)<br>EP Appendix G – Oil Spill Discussion | Routine activities are not anticipated to affect Alabama's coastal water quality or water resources. The proposed activities will be conducted in Federal OCS waters, approximately 120 miles (193 km) from the nearest Alabama shoreline. All discharges for the proposed activity will be governed by a National Pollutant Discharge Elimination System General Permit. The authorized overboard discharges during the proposed activities will be localized in offshore waters and are not expected to affect Alabama's water quality or water resources. BP will be using onshore support facilities in Louisiana.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. The precautions addressed in BP's standard safety and environmental operating procedures and its Regional OSRP are consistent with the core policies of conserving surface and ground waters for full beneficial use. | Yes |
| Air Quality | EP Section 7 – Air Emissions Information<br>EP Appendix I – EIA (C.1.1 Air Quality) | Routine activities are not anticipated to affect Alabama's coastal air quality. The proposed activities will be conducted in Federal OCS waters, approximately 120 miles (193 km) from the nearest Alabama shoreline.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. The precautions addressed in BP's standard safety and environmental operating procedures and its Regional OSRP are consistent with the protection of coastal air quality. | Yes |
| Wetlands and Endemic Submerged Aquatic Vegetation | EP Section 5 – Biological, Physical, and Socioeconomic Information<br>EP Section 8 – Oil Spill Information<br>EP Appendix I –(C.7 Coastal Habitats and Protected Areas)<br>EP Appendix G – Oil Spill Discussion | Routine activities are not anticipated to affect Alabama's wetlands and endemic submerged aquatic vegetation. The proposed activities will be conducted in Federal OCS waters approximately 120 miles (193 km) from the nearest Alabama shoreline. BP will be potentially use onshore support facilities in Alabama. However, there will be no new construction, dredging, or filling on Alabama's lands or waters that could affect wetlands or submerged seagrass beds.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts on wetlands, grassbeds, and other coastal habitats. | Yes |

Table 1. (Continued).

| Policy | Cross Reference to the EP | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Beach and Dune Protection | EP Section 5 – Biological, Physical, and Socioeconomic Information<br>EP Section 8 – Oil Spill Information<br>EP Appendix I – EIA (C.7 Coastal Habitats and Protected Areas)<br>EP Appendix G – Oil Spill Discussion | Routine activities are not anticipated to affect Alabama's beaches and dunes. The proposed activities will be conducted in Federal OCS waters approximately 120 miles (193 km) from the nearest Alabama shoreline. BP will potentially use onshore support facilities in Alabama. However, there will be no new construction, dredging, or filling on Alabama's lands or waters that could weaken, damage, or destroy the integrity of the coastal areas or cause erosion of beaches or dunes.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize shoreline erosion and impacts on beach and dune systems. | Yes |
| Wildlife Habitat Protection | EP Section 5 – Biological, Physical, and Socioeconomic Information<br>EP Section 8 – Oil Spill Information<br>EP Appendix I – EIA (C.3 Threatened, Endangered, and Protected Species and Critical Habitat; and C.7 Coastal Habitats and Protected Areas)<br>EP Appen3<br>dix G – Oil Spill Discussion | Routine activities are not anticipated to affect Alabama's wildlife habitat. The proposed activities will be conducted in Federal OCS waters approximately 120 miles (193 km) from the nearest Alabama shoreline. BP will potentially use onshore support facilities in Alabama. However, there will be no new construction, dredging, or filling on Alabama's lands or waters that could affect coastal wildlife habitats, including critical habitats for endangered or threatened species.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts on wildlife habitats. | Yes |
| Threatened and Endangered Species | EP Section 5 – Biological, Physical, and Socioeconomic Information<br>EP Section 8 – Oil Spill Information<br>EP Section 9 – Environmental Monitoring and Mitigation Measures<br>EP Appendix I – EIA (C.3 Threatened, Endangered, and Protected Species and Critical Habitat)<br>EP Appendix G – Oil Spill Discussion | Routine activities are not anticipated to affect Alabama's endangered species. The proposed activities will be conducted in Federal OCS waters approximately 120 miles (193 km) from the nearest Alabama shoreline. BP will be potentially use onshore support facilities in Alabama. However, there will be no new construction, dredging, or filling on Alabama's lands or waters that could affect endangered or threatened species or their coastal wildlife habitats.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts on endangered and threatened species and their habitats. | Yes |

Table 1. (Continued).

| Policy | Cross Reference to the EP | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Cultural Resources Protection | EP Section 5 – Biological, Physical, and Socioeconomic Information<br>EP Appendix I – EIA (C.6 Archaeological Resources)<br>EP Appendix G – Oil Spill Discussion | Routine activities are not anticipated to affect Alabama's cultural resources located within the coastal zone. The proposed activities will be conducted in Federal OCS waters approximately 120 miles (193 km) from the nearest Alabama shoreline. BP will potentially use onshore support facilities in Louisiana. However, BP does not anticipate the proposed activities will affect any sunken or abandoned ships or objects of historical or archaeological value located on Alabama lands or waters.<br>In the event of a spill, BP will implement the plans and procedures of its Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts to sensitive resources. | Yes |

EIA = Environmental Impact Analysis; EP = Exploration Plan.

# 4 References Cited


Alabama Department of Conservation & Natural Resources, 2017. Alabama Coastal Area Management Program IV.

National Oceanic and Atmospheric Administration and Alabama Coastal Area Board. 1979. The Alabama Coastal Area Management Program and Final Environmental Impact Statement.

# Appendix I: Environmental Impact Analysis (EIA) –

# Environmental Impact Analysis

For a

REVISED EXPLORATION PLAN
for
Mississippi Canyon Block 562 (OCS-G-19966)
Offshore Alabama

April 2018

**Prepared for:**

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**Prepared by:**

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# Acronyms and Abbreviations

| | |
|---|---|
| ac | acre |
| ADIOS2 | Automated Data Inquiry for Oil Spills 2 |
| bbl | barrel |
| BOEM | Bureau of Ocean Energy Management |
| BOEMRE | Bureau of Ocean Energy Management, Regulation and Enforcement |
| BOP | blowout preventer |
| BP | BP Exploration & Production Inc. |
| BSEE | Bureau of Safety and Environmental Enforcement |
| CFR | Code of Federal Regulations |
| $CH_4$ | methane |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| dB re 1 μPa | decibel relative to one micropascal |
| DP | dynamically positioned |
| DPS | distinct population segment |
| EFH | Essential Fish Habitat |
| EIA | Environmental Impact Analysis |
| EIS | Environmental Impact Statement |
| EP | Exploration Plan |
| ESA | Endangered Species Act |
| FAD | fish aggregating device |
| FR | *Federal Register* |
| ft | feet |
| GMFMC | Gulf of Mexico Fishery Management Council |
| GPS | global positioning system |
| $H_2S$ | hydrogen sulfide |
| ha | hectare |
| HAPC | Habitat Area of Particular Concern |
| Hz | hertz |
| IMT | Incident Management Team |
| IPF | impact-producing factor |
| km | kilometer |
| m | meter |
| MARPOL | International Convention for the Prevention of Pollution from Ships |
| MC | Mississippi Canyon |
| MMC | Marine Mammal Commission |
| MMPA | Marine Mammal Protection Act |
| MMS | Minerals Management Service |
| MODU | mobile offshore drilling unit |
| NAAQS | National Ambient Air Quality Standards |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| $NO_x$ | nitrogen oxides |
| NPDES | National Pollutant Discharge Elimination System |
| NRDA | Natural Resource Damage Assessment |
| NTL | Notice to Lessees and Operators |
| NWR | National Wildlife Refuge |
| OCS | Outer Continental Shelf |
| OSRA | Oil Spill Risk Analysis |
| OSRP | Oil Spill Response Plan |
| PAH | polycyclic aromatic hydrocarbons |
| PM | particulate matter |
| SBM | synthetic-based drilling muds |
| SEMS | Safety and Environmental Management system |
| $SO_x$ | sulfur oxides |
| SPL | sound pressure level |
| SWSS | Sperm Whale Seismic Study |
| USCG | U.S. Coast Guard |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| VOC | volatile organic compound |
| WBM | Water-based drilling muds |
| WCD | worst case discharge |

# Introduction

BP Exploration & Production Inc. (BP) is submitting a Revised Exploration Plan (EP) for Mississippi Canyon (MC) Block 562 (MC 562), Gulf of Mexico, Outer Continental Shelf (OCS)-G-19966. Under this EP, BP proposes to drill and complete one appraisal well (MC 562-B) in MC 562. This report provides the Environmental Impact Analysis (EIA) for the activities proposed by BP.

MC 562 is located within the Central Gulf of Mexico OCS Planning Area, approximately 64 statute miles (103 kilometers [km]) from the nearest shoreline (Plaquemines Parish, Louisiana), 125 statute miles (201 km) from the regional onshore support base (Port Fourchon, Louisiana), and 168 statute miles (270 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed wellsite is approximately 1,962 meters (m) (6,436 feet [ft]). A dynamically positioned (DP) semisubmersible drilling rig or a DP drillship is anticipated to be on site for approximately 120 days for drilling and completion.

The EIA for this EP was prepared for submittal to the Bureau of Ocean Energy Management (BOEM) in accordance with applicable regulations, including Title 30 Code of Federal Regulations (CFR) 550.212(o) and 550.227. The EIA is a project- and site-specific analysis of the potential environmental impacts of BP's planned activities. The EIA complies with guidance provided in existing Notices to Lessees and Operators (NTLs) issued by BOEM and its predecessors, Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), including NTLs 2008-G04 (extended by 2015-N02) and 2015-N01. Potential impacts from drilling activities have been analyzed at a broader level in the 2017-2022 Programmatic Environmental Impact Statement (EIS) for the OCS Oil and Gas Leasing Program (BOEM, 2016a) and in multisale EISs for the Western and Central Gulf of Mexico Planning Areas (BOEM, 2012a, b, 2013, 2014, 2015, 2016b, 2017a, b). The most recent multisale EIS contains updated environmental baseline information after the Macondo (*Deepwater Horizon*) incident and addresses potential impacts of a catastrophic spill (BOEM, 2012a, b, 2013, 2014, 2015, 2016b, 2017a, b). The impact analyses from those documents are incorporated here by reference.

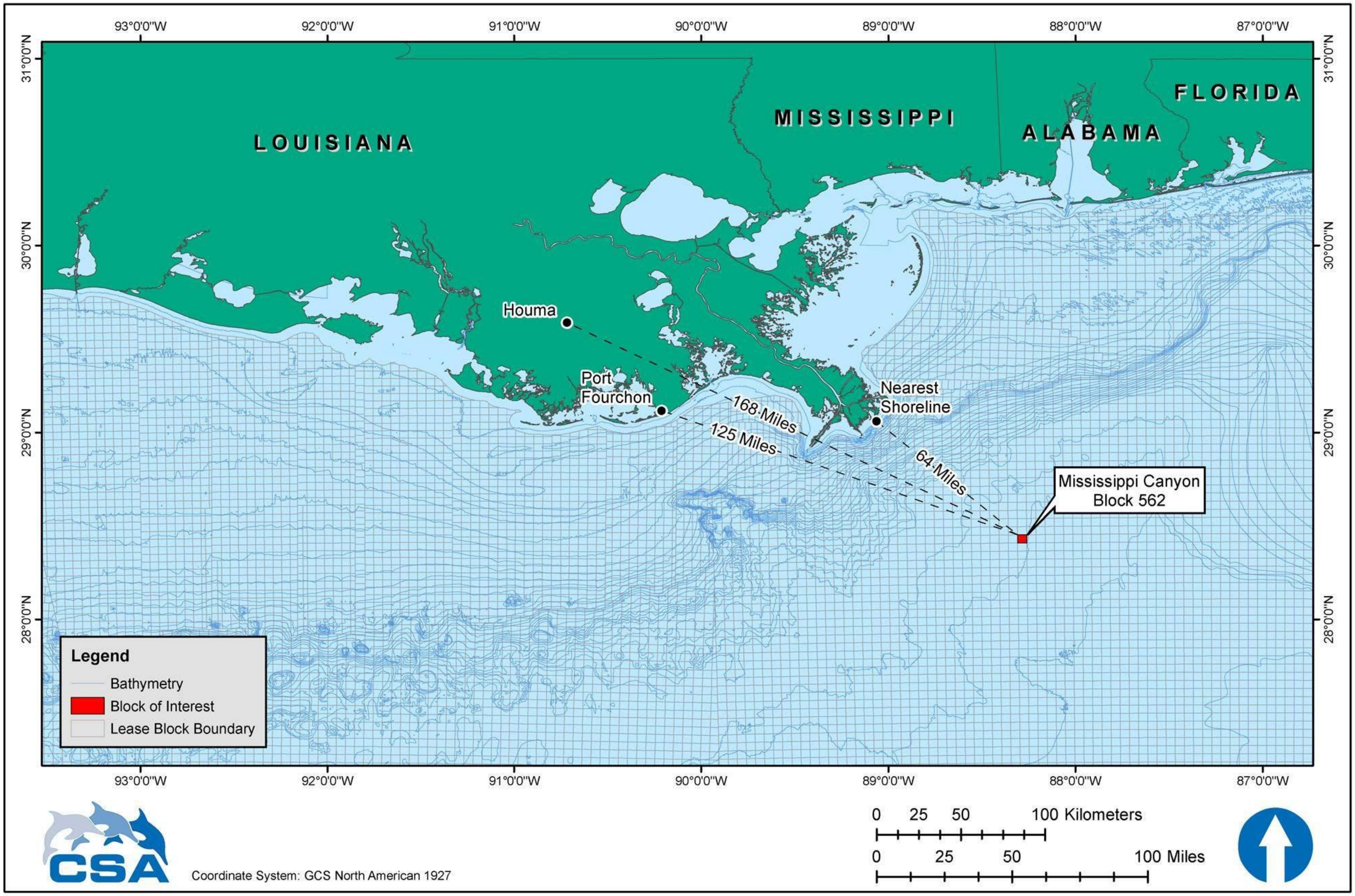


Figure 1. Location of Mississippi Canyon Block 562 in the Gulf of Mexico.

Oil spill response-related activities for wells to be drilled under BP's EP are governed by the BP Regional Oil Spill Response Plan (OSRP), as filed by the Gulf of Mexico Region of BP Exploration & Production Inc. (BPXP – 02481) on 15 August 2017. The OSRP was filed on behalf of several BP companies, including BP Exploration & Production Inc. (Operator No. 02481) and approved by the Bureau of Safety and Environmental Enforcement (BSEE) on 7 September 2017. The BP OSRP is expected to meet the requirements contained in 30 CFR Part 254. BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP, according to 30 CFR Part 553 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities." The OSRP details BP's plan for response to manage oil spills that may result from drilling and production operations. BP has designed its response program based on a regional capability of response to spills ranging from small operations-related spills to a worst case discharge (WCD) from a well blowout. BP's spill response program is intended to meet the planning requirements of the relevant coastal states and applicable federal oil spill planning regulations. The OSRP includes information regarding BP's incident management team (IMT) and dedicated response assets, potential spill risks, and local environmentally sensitive areas. The OSRP describes personnel and equipment mobilization, the incident management team organization, and an overview of strategies, actions and notifications to be taken in the event of a spill.

The EIA is organized into **Sections A** through **I** corresponding to the information required by NTLs 2008-G04 and 2015-N01. The main impact-related discussions are in **Section A** (Impact-Producing Factors) and **Section C** (Impact Analysis). **Table 1** lists and summarizes the NTLs applicable to the EIA.

Table 1. Notices to Lessees and Operators (NTLs) applicable to the Environmental Impact Analysis (EIA).

| NTL | Title | Summary |
|---|---|---|
| BOEM-2016-G01 | Vessel Strike Avoidance and Injured/Dead Protected Species Reporting | Recommends protected species identification training; recommends that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel movement to avoid striking protected species; and requires operators to report sightings of any injured or dead protected species. |
| BOEM-2016-G02 | Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program | Summarizes seismic survey mitigation measures, updates regulatory citations, and provides clarification on how the measures identified in the NTL will be used by the Bureau of Ocean Energy Management (BOEM), Bureau of Safety and Environmental Enforcement, and operators in order to comply with the Endangered Species Act and the Marine Mammals Protection Act. |
| BSEE-2015-G03 | Marine Trash and Debris Awareness and Elimination | Instructs operators to exercise caution in the handling and disposal of small items and packaging materials; requires the posting of instructional placards at prominent locations on offshore vessels and structures; and mandates a yearly marine trash and debris awareness training and certification process. |
| BOEM 2015-N02 | Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance | Eliminates expiration dates (past or upcoming) of all NTLs currently posted on the BOEM website. |

Table 1. (Continued).

| NTL | Title | Summary |
|---|---|---|
| BOEM 2015-N01 | Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the Outer Continental Shelf (OCS) for Worst Case Discharge and Blowout Scenarios | Provides guidance regarding information required in worst case discharge descriptions and blowout scenarios. |
| BOEM 2014-G04 | Military Warning and Water Test Areas | Provides contact links to individual command headquarters for the military warning and water test areas in the Gulf of Mexico. |
| BSEE-2012-N06 | Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans | Provides clarification, guidance, and information for preparation of regional Oil Spill Response Plans. Recommends description of response strategy for worst-case discharge scenarios to ensure capability to respond to oil spills is both efficient and effective. |
| 2011-JOINT-G01 | Revisions to the List of OCS Blocks Requiring Archaeological Resource Surveys and Reports | Provides new information of which OCS blocks require archaeological surveys and reports; identifies required survey line spacing in each block. This NTL augments NTL 2005-G07. |
| 2010-N10 | Statement of Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources | Informs operators using subsea or surface blowout preventers on floating facilities that applications for well permits must include a statement signed by an authorized company official stating that the operator will conduct all activities in compliance with all applicable regulations, including the increased safety measures regulations (75 *Federal Register* [FR] 63346). Informs operators that the Bureau of Ocean Energy Management will be evaluating whether each operator has submitted adequate information demonstrating that it has access to and can deploy containment resources to respond promptly to a blowout or other loss of well control. |
| 2009-G40 | Deepwater Benthic Communities | Provides guidance for avoiding and protecting high-density deepwater benthic communities (including chemosynthetic and deepwater coral communities) from damage caused by OCS oil and gas activities in water depths greater than 300 m (984 ft). Prescribes separation distances of 610 m (2,000 ft) from each mud and cuttings discharge location and 76 m (250 ft) from all other seafloor disturbances. |
| 2009-G39 | Biologically Sensitive Underwater Features and Areas | Provides guidance for avoiding and protecting biologically sensitive features and areas (i.e., topographic features, pinnacles, low relief live bottom areas, and other potentially sensitive biological features) when conducting OCS operations in water depths less than 300 m (984 ft) in the Gulf of Mexico. |
| 2008-G04 | Information Requirements for Exploration Plans and Development Operations Coordination Documents | Provides guidance on information requirements for OCS plans, including EIA requirements and information regarding compliance with the provisions of the Endangered Species Act and Marine Mammal Protection Act. |
| 2005-G07 | Archaeological Resource Surveys and Reports | Provides guidance on regulations regarding archaeological discoveries, specifies requirements for archaeological resource surveys and reports, and outlines options for protecting archaeological resources. |

# A. Impact-Producing Factors

Based on the description of BP's proposed activities, a series of impact-producing factors (IPFs) have been identified; IPFs include both routine activities and accidental events. **Table 2** identifies the environmental resources that may be affected in the left column, and identifies sources of impacts associated with the proposed project across the top. **Table 2,** adapted from Form BOEM-0142, has been developed *a priori* to focus the impact analysis on those resources that may be impacted as a result of one or more IPFs. An "X" indicates that an IPF could reasonably be expected to affect a certain resource, and a dash (--) indicates no impact or negligible impact. Where there may be an effect, an analysis is provided in **Section C**. Potential IPFs for the proposed activities are listed below and briefly discussed in the following sections.

- Drilling rig presence (including sound and lights);
- Physical disturbance to the seafloor;
- Air pollutant emissions;
- Effluent discharges;
- Water intake;
- Onshore waste disposal;
- Marine debris;
- Support vessel and helicopter traffic (includes vessel collisions with resources and marine sound); and
- Accidents.

Table 2. Matrix of impact-producing factors (IPF) and affected environmental resources. X = potential impact; dash (--) = no impact or negligible impact.

| Environmental Resources | Impact-Producing Factors | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Drilling Presence (incl. sound & lights) | Physical Disturbance to Seafloor | Air Pollutant Emissions | Effluent Discharges | Water Intake | Onshore Waste Disposal | Marine Debris | Support Vessel/Helo Traffic | Accidents | |
| | | | | | | | | | Small Fuel Spill | Large Oil Spill |
| **Physical/Chemical Environment** | | | | | | | | | | |
| Air quality | -- | -- | --**X**(9) | -- | -- | -- | -- | -- | **X**(6) | **X**(6) |
| Water quality | -- | -- | -- | **X** | -- | -- | -- | -- | **X**(6) | **X**(6) |
| **Seafloor Habitats and Biota** | | | | | | | | | | |
| Soft bottom benthic communities | -- | **X** | -- | **X** | -- | -- | -- | -- | -- | **X**(6) |
| High-density deepwater benthic communities | -- | --(4) | -- | --(4) | -- | -- | -- | -- | -- | **X**(6) |
| Designated topographic features | -- | --(1) | -- | --(1) | -- | -- | -- | -- | -- | -- |
| Pinnacle trend area live bottoms | -- | --(2) | -- | --(2) | -- | -- | -- | -- | -- | -- |
| Eastern Gulf live bottoms | -- | --(3) | -- | --(3) | -- | -- | -- | -- | -- | -- |
| **Threatened, Endangered, and Protected Species and Critical Habitat** | | | | | | | | | | |
| Sperm whale (endangered) | **X**(8) | -- | -- | -- | -- | -- | -- | **X**(8) | **X**(6,8) | **X**(6,8) |
| West Indian manatee (threatened) | -- | -- | -- | -- | -- | -- | -- | **X**(8) | -- | **X**(6,8) |
| Non-endangered marine mammals (protected) | **X** | -- | -- | -- | -- | -- | -- | **X** | **X**(6) | **X**(6) |
| Sea turtles (endangered/threatened) | **X**(8) | -- | -- | -- | -- | -- | -- | **X**(8) | **X**(6,8) | **X**(6,8) |
| Piping Plover (threatened) | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| Whooping Crane (endangered) | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| Oceanic whitetip shark (threatened) | **X** | | | | | | | | | **X**(6) |
| Gulf sturgeon (threatened) | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| Beach mice (endangered) | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| Threatened coral | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| **Coastal and Marine Birds** | | | | | | | | | | |
| Marine birds | **X** | -- | -- | -- | -- | -- | -- | **X** | **X**(6) | **X**(6) |
| Shorebirds and coastal nesting birds | -- | -- | -- | -- | -- | -- | -- | **X** | -- | **X**(6) |
| **Fisheries Resources** | | | | | | | | | | |
| Pelagic communities and ichthyoplankton | **X** | -- | -- | **X** | **X** | -- | -- | -- | **X**(6) | **X**(6) |
| Essential Fish Habitat | **X** | -- | -- | **X** | **X** | -- | -- | -- | **X**(6) | **X**(6) |
| **Archaeological Resources** | | | | | | | | | | |
| Shipwreck sites | -- | --(7) | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| Prehistoric archaeological sites | -- | --(7) | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| **Coastal Habitats and Protected Areas** | | | | | | | | | | |
| Barrier beaches and dunes | -- | -- | -- | -- | -- | -- | -- | **X** | -- | **X**(6) |
| Wetlands and seagrass beds | -- | -- | -- | -- | -- | -- | -- | **X** | -- | **X**(6) |
| Coastal wildlife refuges and wilderness areas | -- | -- | -- | -- | -- | -- | -- | **--** | -- | **X**(6) |
| **Socioeconomic and Other Resources** | | | | | | | | | | |
| Recreational and commercial fishing | **X** | -- | -- | -- | -- | -- | -- | -- | **X**(6) | **X**(6) |
| Public health and safety | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(5,6) |
| Employment and infrastructure | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| Recreation and tourism | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| Land use | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |
| Other marine uses | -- | -- | -- | -- | -- | -- | -- | -- | -- | **X**(6) |

X indicates potential impact; dash (--) indicates no impact or negligible impact; numbers refer to table footnotes; Helo = helicopter.

**Table 2 Footnotes and Applicability to this Program:**

*Footnotes are numbered to correspond to entries in **Table 2**; applicability to each case is noted by a bullet point following the footnote.*

(1) *Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well, rig site, or any anchors will be on the seafloor within the following:*
   (a) *4-mile zone of the Flower Garden Banks, or the 3-mile zone of Stetson Bank;*
   (b) *1,000-m, 1-mile, or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an Outer Continental Shelf (OCS) lease;*
   (c) *Essential Fish Habitat (EFH) criteria of 152 m (500 ft) from any no-activity zone; or*
   (d) *Proximity of any submarine bank (152 m [500-ft] buffer zone) with relief greater than 2 m (7 ft) that is not protected by the Topographic Features Stipulation attached to an OCS lease.*
   - None of these conditions (a through d) are applicable. The project area is not within or near any marine sanctuary, topographic feature, submarine bank, or no-activity zone.

(2) *Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.*
   - The Live Bottom (Pinnacle Trend) Stipulation is not applicable to the project area.

(3) *Activities within any Eastern Gulf OCS block where seafloor habitats are protected by the Live Bottom (Low-Relief) Stipulation attached to an OCS lease.*
   - The Live Bottom (Low-Relief) Stipulation is not applicable to the project area.

(4) *Activities on blocks designated by the BOEM as being in water depths 400 m or greater.*
   - No impacts are anticipated to high-density deepwater benthic communities. There are no features indicative of seafloor hard bottom that could support high-density chemosynthetic communities or coral communities within 610 m (2,000 ft) of the proposed wellsite location (BP, 2018).

(5) *Exploration or production activities where Hydrogen Sulfide ($H_2S$) concentrations greater than 500 ppm might be encountered.*
   - MC 562 is classified as $H_2S$ absent under a previously approved Initial EP.

(6) *All activities that could result in an accidental spill of produced liquid hydrocarbons or diesel fuel that you determine would impact these environmental resources. If the proposed action is located a sufficient distance from a resource that no impact would occur, the EIA can note that in a sentence or two.*
   - Accidental hydrocarbon spills could affect the resources marked (X) in the matrix, and impacts are analyzed in **Section C**.

(7) *All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or prehistoric site that no impact would occur, the EIA can note that in a sentence or two.*
   - No impacts are expected to archaeological resources. While MC 562 is on the list of high-probability blocks for shipwrecks (BOEM, 2011), the project area is well beyond the 60-m depth contour used by BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of Mexico. The site clearance letter (BP, 2018), reported that no archaeologically significant sonar contacts were identified within 610 m (2,000 ft) of the proposed wellsite.

(8) *All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.*
   - IPFs that may affect marine mammals, sea turtles, or their critical habitats include drilling rig presence, support vessel and helicopter traffic, and accidents. See **Section C**.

(9) *Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.*
   - Not applicable.

## A.1 Drilling Rig Presence (Including Underwater Sound and Surface Lights)

The well proposed in this EP will be drilled using either a DP drillship or a DP semisubmersible drilling rig. DP vessels use a global positioning system (GPS), specific computer software, and sensors in conjunction with a series of thrusters to maintain position. Through satellite navigation and position reference sensors, the location of the drilling rig is precisely monitored while thrusters, positioned at various locations about the rig pontoons, are activated to maintain position. This allows operations at sea in areas where mooring or anchoring is not feasible. Consequently, there will be no anchoring of the drilling rig in MC 562 during this project. The selected drilling rig is expected to be on site for an estimated 120 days, inclusive of mobilization and demobilization time. The drilling rig will maintain exterior lighting in accordance with applicable federal navigation and aviation safety regulations (International Regulations for Preventing Collisions at Sea, 1972 [72 COLREGS], Part C).

Potential impacts to marine resources from the drilling rig include the physical presence of the drilling rig in the ocean, working and safety lighting on the rig, and underwater sound produced during operations.

The physical presence of the drilling rig in the ocean can attract and potentially impact pelagic marine resources, as discussed in **Section C.5.1**. DP drillships and semisubmersible drilling rigs maintain exterior lighting for working at night and for navigational and aviation safety in accordance with applicable federal safety regulations. This artificial lighting may also attract and directly or indirectly impact natural resources. Drilling operations produce underwater sounds that may impact certain marine resources. Sources of drilling-related sounds include, for example, riser rotation, DP thrusters, remotely operated vehicle (ROV) operations and seabed mounted active acoustics (such as ultra-short baseline systems) for positioning.

The drilling rig operations and equipment can be expected to produce noise associated with propulsion machinery that transmits directly to the water during station keeping, drilling, and maintenance operations. Additional sound and vibration are transmitted through the hull to the water from auxiliary machinery, such as generators, pumps, and compressors onboard the drilling rig (Richardson et al., 1995). The noise levels produced by DP vessels for station-keeping are largely dependent on the level of thruster activity required to keep position and, therefore, vary based on local ocean currents, sea and weather conditions, and operational requirements. Representative source levels for vessels in DP activities range from 184 to 190 decibel relative to one micropascal (dB re 1 µPa), with a primary amplitude frequency below 600 hertz (Hz) (Blackwell and Greene Jr., 2003, McKenna et al., 2012, Kyhn et al., 2014).

Drilling operations produce noise that includes strong tonal components at low frequencies (MMS, 2000). When drilling, the drill string represents a long vertical sound source (McCauley, 1998). Based on available data, marine sound generated from drilling rigs during drilling, in the absence of thrusters, can be expected to range between 154 and 176 dB re 1 µPa m (Nedwell et al., 2001). Sound pressure levels associated with drilling operations from a drilling rig on active thrusters have a broadband (10 Hz to 10 kilohertz [Hz]) energy of approximately 190 dB re 1 µPa m (Hildebrand, 2005). The use of thrusters, whether drilling or not, can elevate sound source levels from a drillship or semisubmersible to approximately 188 dB re 1 µPa m (Nedwell and Howell, 2004). Nedwell and Edwards (2004) reported that the majority of noise from a semi-submersible drilling rig occurred below 600 Hz and sound pressure levels increased by 10 to 20 dB when drilling was active. Within the low bandwidths (<600 Hz), measured sound pressure levels were shown to be greatly influenced by the drilling rig for up to 2 km; but at distances beyond 5 km, the drill rig did not contribute significantly to the overall sound pressure levels in that bandwidth.

## A.2 Physical Disturbance to the Seafloor

In water depths of 600 m (1,969 ft) or greater, DP drilling rigs disturb only a very small area of the seafloor around the wellbore where the bottom template and blowout preventer (BOP) are located. Depending on the specific well configuration, the total disturbed area is estimated to be 0.25 hectares (ha) (0.62 acres [ac]) per well (BOEM, 2012a). For the one well proposed in this EP, the total potential area of seafloor disturbance is expected to be approximately 0.25 ha (0.62 ac).

## A.3 Air Pollutant Emissions

The air pollutant emissions are calculated in accordance with BOEM requirements and summarized in the Air Quality Emissions Report in EP Section 7 and EP Appendix E. The primary air pollutants typically associated with OCS activities are suspended particulate matter (PM), sulfur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO). These emissions occur mainly from combustion of fuels by diesel and natural gas powered generators, pumps and motors.

The Air Quality Emissions Report indicates that the projected emissions are below exemption levels set by the applicable regulations in 30 CFR 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants. No further analysis or control measures are required.

## A.4 Effluent Discharges

Effluent discharges are summarized in EP Section 6.2 and EP Appendix D. All offshore discharges are expected to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit issued by the U.S. Environmental Protection Agency (USEPA) and any applicable U.S. Coast Guard (USCG) regulations.

Water-based drilling muds (WBM) and cuttings are expected to be released at the seafloor during the initial well-drilling intervals before the marine riser that enables the return of muds and cuttings to the surface is set. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Synthetic-based drilling muds (SBMs) will be collected on the rig and will either be reused by the vendor or transported to Port Fourchon, Louisiana, for recycling and/or disposal at an approved facility. Cuttings wetted with SBMs will be discharged at the surface in accordance with the NPDES permit conditions.

Other effluent discharges covered by the NPDES permit include treated sanitary and domestic wastes, deck drainage, well treatment, and completion and workover fluids. Miscellaneous discharges of seawater and freshwater to which treatment chemicals have been added, uncontaminated ballast and bilge water, fire water, cooling water, excess cement slurry, and blowout prevention fluids also are expected to be discharged in accordance with the conditions in the NPDES permit.

Under certain circumstances, the drilling rig may relocate to a safe zone which is not located within the leased area to avoid severe weather, loop currents, or to conduct routine maintenance while idled from drilling activities. During these limited times of safe zone harboring, incidental vessel discharges may occur. These discharges are expected to be within the limits represented in the waste and water discharge table estimates submitted as part of this EP and permitted via a Notice of Intent (NOI) under the NPDES permit.

## A.5 Water Intake

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. Section 316(b) of the Clean Water Act requires NPDES permits to ensure that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available to minimize adverse environmental impact from impingement and entrainment of aquatic organisms. The General NPDES Permit specifies design requirements for facilities for which construction commenced after 17 July 2006 with a cooling water intake structure having a design intake capacity of greater than two million gallons of water per day, of which at least 25% is used for cooling purposes. It is expected that the drilling rig ultimately selected for this project will be in compliance with all applicable cooling water intake structure design requirements, monitoring, and limitations. Where applicable, the drilling rig operator takes responsibility for obtaining necessary NPDES permit coverage for its cooling water intake structure and associated permit compliance.

## A.6 Onshore Waste Disposal

A list of the solid and liquid wastes generated during this project to be disposed of onshore are tabulated in EP Section 6.1. Typical waste streams requiring onshore disposal from a project of this nature include the following:

- Unused synthetic-based drilling fluid, SBM solids and barite, contaminated SBM, and drilling mud contaminated absorbents;
- Excess barite and cement;
- Completion fluids and rig drilling washwater;
- Well-related hazardous waste
- Rig maintenance wastes (hazardous and non-hazardous);
- Used rig oil (e.g., lube oil, hydraulic oil, glycol);
- Domestic (e.g., municipal trash) and universal wastes (e.g., batteries, florescent light bulbs);
- Nonhazardous domestic recyclables (e.g., plastic, paper, aluminum);
- Scrap metal;
- Oily water;
- Radioactive waste; and
- Miscellaneous unused chemicals.

These waste streams are expected to be segregated on the drilling rig and transported to shore for disposal in an appropriately permitted facility. All other wastes generated by BP and its contractors are managed by their respective waste management procedures. Compliance with established practices and procedures is expected to result in either no or negligible impacts from this factor.

## A.7 Marine Debris

BP intends to comply with all applicable regulations relating to solid waste handling, transportation and disposal, including the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) Annex V requirements, and USEPA, USCG, BSEE, and BOEM regulations. These regulations include prohibitions and compliance requirements regarding the deliberate discharging of containers and other similar materials (i.e., trash and debris) into the marine environment as well as the protective measures to be implemented to prevent the accidental loss of solid material into the marine environment. For example, BSEE regulations 30 CFR 250.300(a) and (b)(6) prohibit operators from deliberately discharging containers and other similar materials (i.e., trash and debris) into the marine environment, and 30 CFR 250.300(c) requires durable identification markings on equipment, tools, containers (especially drums), and other material. The USEPA and USCG regulations require operators to be proactive in avoiding accidental loss of solid materials by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. In addition to the regulations in 30 CFR 250, BSEE issued NTL BSEE-2015-G03 which instructs operators to exercise caution in handling and disposal of small items and packaging materials, requires posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly training and certification process for marine trash and debris awareness. Compliance with these requirements is expected to result in either no or negligible impacts from this factor.

## A.8 Support Vessel and Helicopter Traffic

BP will use existing shorebase facilities at Port Fourchon, Louisiana, for support vessel activities. Support helicopters are expected to be based at heliport facilities in Houma, Louisiana. No terminal expansion or construction is planned at either location to support the proposed project.

The project will be supported by onshore crew boats and supply vessels making generally two to four round trips per week respectively. The boats typically move to the project area via the most direct route from the shorebase.

A helicopter will make approximately seven round trips per week between the drilling rig and the heliport. The helicopter will be used to transport personnel and small supplies and will normally take the most direct route of travel between the shorebase and the project area when air traffic and weather conditions permit. Offshore support helicopters typically maintain a minimum altitude of 213 m (700 ft) while in transit offshore, 305 m (1,000 ft) over unpopulated areas or across coastlines, and 610 m (2,000 ft) over populated areas and sensitive habitats such as wildlife refuges and park properties. Additional guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 91 m (300 ft) of marine mammals (BOEM, 2012a).

**Table 3** summarizes the estimated fuel capacity and trip frequency of the support vessels and aircraft.

Table 3. Support vessel and aircraft fuel capacity and trip frequency or duration in Mississippi Canyon Block 562 during the proposed exploratory drilling project.

| Vessel/Aircraft Type | Maximum Fuel Tank Storage Capacity | Trip Frequency or Duration |
|---|---|---|
| Helicopter | 760 gal | 7 flights per week |
| Crew boats | 1,000 bbl | 2 trips per week |
| Supply Boats | 5,000 bbl | 4 trips per week |

gal = gallons; bbl = barrel.

Offshore support vessels associated with the proposed project will contribute to the overall acoustic environment by transmitting noise through both air and water. The support vessels will use conventional diesel-powered screw propulsion. Vessel noise is a combination of narrow band (tonal) and broadband sound (Richardson et al., 1995, Hildebrand, 2009, McKenna et al., 2012). Tones of very low frequency typically dominate up to approximately 50 Hz, whereas broadband sounds may extend to 100 kHz. The primary sources of vessel noise are propeller cavitation, propeller singing, and propulsion; other sources include engine noise, flow noise from water dragging along the hull, and bubbles breaking in the vessel's wake (Richardson et al., 1995). The intensity of noise from support vessels is roughly related to ship size, weight, and speed. Broadband source levels for smaller boats (a category that include supply and other service vessels) are in the range of 150 to 180 dB re 1 µPa m (Richardson et al., 1995, Hildebrand, 2009, McKenna et al., 2012).

Penetration of aircraft noise below the sea surface is greatest directly below the aircraft. Aircraft noise produced at angles greater than 13 degrees from vertical is mostly reflected from the sea surface and does not propagate into the water (Richardson et al., 1995). The duration of underwater sound from passing aircraft is much shorter in water than air; for example, a helicopter passing at an altitude of 152 m (500 ft) that is audible in air for 4 minutes may be detectable under water for only 38 seconds at 3 m (10 ft) depth and for 11 seconds at 18 m (59 ft) depth (Richardson et al., 1995).

Dominant tones in noise spectra from helicopters are below 500 Hz with a source level of approximately 149 to 151 dB re 1 Pa m (for a Bell 212 helicopter) (Richardson et al., 1995). Levels of noise received underwater from passing aircraft depend on the aircraft's altitude, the aspect (direction and angle) of the aircraft relative to the receiver, receiver depth, water depth, and seafloor type (Richardson et al., 1995). Received level diminishes with increasing receiver depth when an aircraft is directly overhead, but may be stronger at mid-water than at shallow depths when an aircraft is not directly overhead (Richardson et al., 1995). Because of the relatively high expected airspeeds during transits and these physical variables, aircraft-related noise (including both airborne and underwater noise) is expected to be very brief in duration.

## A.9 Accidents

The accidents addressed in the EIA focuses on the following two potential types:

- a small fuel spill, which is the most likely type of spill during OCS exploration activities; and
- a large oil spill, up to and including the WCD for this EP, which is an oil spill resulting from an uncontrolled blowout.

The following subsections summarize assumptions about the sizes and fates of these spills as well as BP's spill response plans. Impacts are analyzed in **Section C**.

Recent EISs (BOEM, 2012a, b, 2013, 2014, 2015, 2016b, 2017a, b) analyzed three other types of accidents relevant to drilling operations that could lead to potential impacts to the marine environment: loss of well control, vessel collision, and chemical and drilling fluid spills. These types of accidents, along with a hydrogen sulfide ($H_2S$) release, are discussed briefly below.

Loss of Well Control. A loss of well control is the uncontrolled flow of a reservoir fluid that may result in the release of gas, condensate, oil, drilling fluids, sand, or water. Loss of well control is a broad term to include incidents that range from very minor to the most serious well control incidents, while blowouts are considered to be a subset of more serious incidents with greater risk of oil spill or human injury (BOEM, 2016a, 2017a, b). Loss of well control may result in the release of drilling fluid or loss of oil. Not all loss of well control events result in blowouts (Bureau of Ocean Energy Management, 2017c). In addition to the potential release of gas, condensate, oil, sand, or water, the loss of well control can also resuspend and disperse bottom sediments (BOEM, 2012a, 2017a). BOEM (2016a) noted that most OCS blowouts have resulted in the release of gas.

BP has a robust system in place to prevent loss of well control. Measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout are described in the NTL 2015-N01 package submitted with this EP, as required by BOEM (as discussed in **Section A.9.2**). The potential for a loss-of-well-control event will be minimized by adhering to the requirements of applicable regulations such as the Final Drilling Safety Rule and NTL 2010-N10, which specify additional safety measures for OCS activities.

Vessel Collisions. BSEE (2016) data show that there were 119 OCS-related collisions between 2009 and 2016. Most collision mishaps are the result of service vessels colliding with platforms or vessel collisions with pipeline risers. Approximately 10% of vessel collisions with platforms and/or rigs in the OCS resulted in diesel spills, and in several collision incidents, fires resulted from hydrocarbon releases. To date, the largest diesel spill associated with a collision occurred in 1979 when an anchor-handling boat collided with a drilling platform in the Main Pass lease area, spilling 1,500 barrels (bbl). Diesel fuel is the product most frequently spilled, but oil, natural gas, corrosion inhibitor, hydraulic fluid, and lube oil have also been released as the result of vessel collisions. Human error accounted for approximately half of all reported vessel collisions from 2006 to 2009. As summarized by BOEM (2017a), vessel collisions occasionally occur during routine operations. Some of these collisions have caused spills of diesel fuel or chemicals. BP intends to comply with all applicable USCG and BOEM safety requirements to minimize the potential for vessel collisions.

Chemical Spills. Chemicals are stored and used for pipeline hydrostatic testing and during drilling and in well completion operations. The relative quantities of their use is reflected in the largest volumes spilled (BOEM, 2017c). Completion, workover, and treatment fluids are the largest quantity of chemical used and comprise the largest releases. Between 2007 and 2014, an average of two chemical spills <50 bbl in volume and three chemical spills >50 bbl in volume occurred each year (BOEM, 2017a).

Drilling Fluid Spills. There is the potential for drilling fluids, specifically SBMs to be spilled due to an accidental riser disconnect (BOEM, 2017a). SBMs are relatively non toxic to the marine environment and have the potential to biodegrade (BOEM, 2014). The majority of SBM releases are <50 bbl in size, but accidental riser disconnects may result in the release of medium (238 to 2,380 bbl) to large (>2,381 bbl) quantities of drilling fluids. In the event of an SBM spill, there could be short-term localized impacts on water quality and the potential for localized benthic impacts due to SBM deposition on the seafloor. Benthic impacts would be similar to those described in **Section C.2.1**. The potential for riser disconnect SBM spills will be minimized by adhering to the requirements of applicable regulations.

$H_2S$ Release. MC 562 was classified as $H_2S$ absent under a previously approved Initial EP.

### A.9.1 Small Fuel Spill

Spill Size. According to the analysis by BOEM (2017b), the most likely type of small spill (<1,000 bbl) resulting from OCS activities is a failure related to the storage of oil or diesel fuel. Historically, most diesel spills have been ≤1 bbl, and this is predicted to be the most common spill volume in ongoing and future OCS activities in the Western and Central Gulf of Mexico Planning Areas (Anderson et al., 2012). As the spill volume increases, the incident rate declines dramatically (BOEM, 2017a). The median size for spills ≤1 bbl is 0.024 bbl, and the median volume for spills of 1 to 10 bbl is 3 bbl (Anderson et al., 2012). For the EIA, a small diesel fuel spill of 3 bbl is assumed as the volume of a small fuel spill as operational experience suggests that the most likely cause of such a spill would be a rupture of the fuel transfer hose resulting in a loss of contents of approximately 3 bbl (BOEM, 2012a).

Spill Fate. The fate of a small fuel spill in the project area would depend on meteorological and oceanographic conditions at the time as well as the effectiveness of spill response activities. However, given the open ocean location of the project area and response actions, it is expected that impacts from a small spill would be minimal (BOEM, 2016a).

The water-soluble fractions of diesel are dominated by two- and three-ringed polycyclic aromatic hydrocarbons (PAHs), which are moderately volatile (National Research Council, 2003a). The constituents of diesel fuel are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. The National Oceanic and Atmospheric Administration (NOAA) has reported that diesel fuel is readily and completely degraded by naturally occurring microbes (NOAA, 2006). Due to its light density, diesel will not sink to the seafloor. Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high suspended solids loads (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico.

Sheens from small fuel spills are expected to persist for relatively short periods of time, ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl), and disperse and evaporate (BOEM, 2012a).

For purposes of the EIA, the fate of a small diesel fuel spill was estimated using the NOAA's Automated Data Inquiry for Oil Spills 2 (ADIOS2) model (NOAA, 2016a). This model uses the physical properties of oils in its database to predict the rate of evaporation and dispersion over time as well as changes in the density, viscosity, and water content of the product spilled. It is estimated that over 90% of a small diesel spill would be evaporated or dispersed within

24 hours. The area of the sea surface with diesel fuel on it during this 24-hour period would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

The ADIOS2 results, coupled with spill trajectory information discussed below for a large spill, indicate that a small fuel spill would not impact coastal or shoreline resources. The project area is 64 statute miles (103 km) from the nearest shoreline (Plaquemines Parish, Louisiana). Slicks from small fuel spills are expected to persist for relatively short periods of time ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl) and rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a). Because of the distance of these potential spills on the OCS and their lack of persistence, it is unlikely that a spill would make landfall prior to dissipation (BOEM, 2012a).

Spill Response. In the unlikely event the shipboard procedures fail to prevent a fuel spill, response equipment and trained personnel would be activated so that any spill effects would be localized and would result only in short-term environmental consequences. EP Appendix G provides a detailed discussion of BP's response efforts if a spill were to occur during operational activities associated with the proposed EP.

Weathering. Following a diesel fuel spill, several physical, chemical, and biological processes, collectively called weathering, interact to change the physical and chemical properties of the diesel, and thereby influence its harmful effects on marine organisms and ecosystems. The most important weathering processes include spreading, evaporation, dissolution, dispersion into the water column, formation of water-in-oil emulsions, photochemical oxidation, microbial degradation, adsorption to suspended particulate matter, and stranding on shore or sedimentation to the seafloor (National Research Council, 2003a).

Weathering decreases the concentration of diesel fuel and produces changes in its chemical composition, physical properties, and toxicity. The more toxic, light aromatic and aliphatic hydrocarbons are lost rapidly by evaporation and dissolution from the slick on the water surface. Evaporated hydrocarbons are degraded rapidly by sunlight. Biodegradation of diesel fuel on the water surface and in the water column by marine bacteria removes first the n-alkanes and then the light aromatics. Other petroleum components are biodegraded more slowly (National Research Council, 2003a). Diesel fuel spill response-related activities for facilities included in this EP are governed by BP's Regional OSRP, which meets the requirements contained in 30 CFR 254.

### A.9.2 Large Oil Spill (Worst Case Discharge)

Spill Size. Day 1 WCD is estimated to be 170,000 barrels of oil per day. The maximum duration of a blowout is estimated at 91 days based on the time required to drill a relief well. The rate profile associated with the well blowout over this 91-day period results in a potential worst case spill volume estimated at 12.65 million bbl of oil. The calculations supporting the blowout scenario WCD are presented in EP Appendix F.

Spill Probability. Statistics from offshore drilling in the U.S. Gulf of Mexico provide a reasonable basis for evaluating oil spill risk during exploratory drilling. Historically, blowouts are rare events and most do not result in oil spills. A 2010 analysis using the SINTEF[1] database estimates a

[1] Stiftelsen for industriell og teknisk forskning (Foundation for Scientific and Industrial Research, Norwegian Institute of Technology).

blowout frequency of 0.0017 per exploratory well for non-North Sea locations (International Association of Oil & Gas Producers, 2010). BOEM has updated spill frequencies to include the *Deepwater Horizon* incident and found that spill rates (bbl spilled per bbl produced) for OCS platform spills were unchanged for spills >1,000 bbl when compared with previously published data (Anderson et al., 2012). According to the BSEE analysis conducted for the Final Drilling Safety Rule issued in 2010, the baseline risk of a catastrophic blowout is estimated to be once every 26 years (75 *Federal Register* [FR] 63365).

Included in EP Appendix F are BP's calculations and information as required by NTL 2015-N01 and 30 CFR 550.219(a)(2)(iv), including descriptions of measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout. BP will also comply with NTL 2010-N10 and the Final Drilling Safety Rule (30 CFR 250), which specifies additional safety measures for OCS activities.

Spill Trajectory. The fate of a large oil spill in the project area would depend on meteorological and oceanographic conditions at the time. The Oil Spill Risk Analysis (OSRA) model is a computer simulation of oil spill transport that uses realistic data for winds and currents to predict spill trajectory. The OSRA report by Ji et al. (2004) provides conditional contact probabilities for shoreline segments in the Gulf of Mexico.

The results for Launch Area 59 (where MC 562 is located) are presented in **Table 4**. The model predicts a <0.5% chance of shoreline contact within 3 days of a spill, and a 1% to 5% chance of shoreline contact within 10 days of a spill (Lafourche and Plaquemines Parishes). Shoreline contact is predicted within 30 days for shorelines ranging from Cameron Parish, Louisiana, to Bay County, Florida. The conditional probability of shoreline contact is low (1% to 2%) for most shorelines with predicted contact within 30 days. However, the conditional probability of shoreline contact to Plaquemines Parish, Louisiana, is 11% within 30 days.

Table 4. Conditional probabilities of a spill in Mississippi Canyon Block 562 (MC 562) contacting shoreline segments based on the 30-day Oil Spill Risk Analysis (OSRA) (From: Ji et al., 2004). Values are conditional probabilities that a hypothetical spill in MC 562 (represented by OSRA Launch Area 59) could contact shoreline segments within 3, 10, or 30 days.

| Shoreline Segment | County or Parish and State | Conditional Probability of Contact[1] (%) | | |
|---|---|---|---|---|
| | | 3 Days | 10 Days | 30 Days |
| C13 | Cameron Parish, Louisiana | -- | -- | 1 |
| C14 | Vermilion Parish, Louisiana | -- | -- | 1 |
| C17 | Terrebonne Parish, Louisiana | -- | -- | 2 |
| C18 | Lafourche Parish, Louisiana | -- | 1 | 2 |
| C19 | Jefferson Parish, Louisiana | -- | -- | 1 |
| C20 | Plaquemines Parish, Louisiana | -- | 5 | 11 |
| C21 | St. Bernard Parish, Louisiana | -- | -- | 2 |
| C29 | Walton County, Florida | -- | -- | 1 |
| C30 | Bay County, Florida | -- | -- | 1 |

1 Conditional probability refers to the probability of contact within the stated time period, assuming that a spill has occurred (-- indicates <0.5%).

The original OSRA modeling runs reported by Ji et al. (2004) did not evaluate the fate of a spill over time periods exceeding 30 days, nor did they estimate the fate of a release that continues over a period of weeks or months. As noted by Ji et al. (2004), the OSRA model does not consider the chemical composition or biological weathering of oil spills, the spreading and splitting of oil spills, or spill response activities. The model does not specify a particular spill size but has been used by BOEM to evaluate contact probabilities for spills greater than 1,000 bbl.

BOEM presented additional OSRA modeling to simulate a spill that continues for 90 consecutive days, with each trajectory tracked for 60 days during four seasons. In this updated OSRA model (herein referred to as the 60-day OSRA model), 60 days was chosen as a conservative estimate of the maximum duration that spilled oil would persist on the sea surface following a spill (BOEM, 2017c). The spatial resolution is limited, with five launch points in the entire Western and Central Planning Areas of the Gulf of Mexico. These launch points were deliberately located in areas identified as having a high possibility of containing large oil reserves. The 60-day OSRA model launch point most appropriate for modeling a spill in the project area is Launch Point 2. The 60-day OSRA results for Launch Point 2 are presented in **Table 5**.

Table 5. Shoreline segments with a 1% or greater conditional probability of contact from a spill starting at Launch Point 2 based on the 60-day Oil Spill Risk Analysis. Values are conditional probabilities that a hypothetical spill in the project area could contact shoreline segments within 60 days. Modified from: BOEM (2017a).

| Season | Spring | | | | Summer | | | | Fall | | | | Winter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day | 3 | 10 | 30 | 60 | 3 | 10 | 30 | 60 | 3 | 10 | 30 | 60 | 3 | 10 | 30 | 60 |
| County or Parish | Conditional Probability of Contact[1] (%) | | | | | | | | | | | | | | | |
| Matagorda, Texas | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1 |
| Vermilion, Louisiana | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1 |
| Terrebonne, Louisiana | -- | -- | -- | -- | -- | -- | -- | 1 | -- | -- | -- | -- | -- | -- | 2 | 2 |
| Lafourche, Louisiana | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1 | 1 | -- | -- | -- | 1 |
| Jefferson, Louisiana | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1 | 1 |
| Plaquemines, Louisiana | -- | 2 | 3 | 3 | 2 | 9 | 17 | 19 | 2 | 17 | 24 | 24 | 1 | 12 | 18 | 20 |
| St. Bernard, Louisiana | -- | 5 | 6 | 6 | 1 | 8 | 13 | 14 | 1 | 8 | 10 | 10 | 1 | 5 | 8 | 8 |
| Hancock, Mississippi | -- | 2 | 3 | 3 | -- | 2 | 2 | 2 | 1 | 2 | 3 | 3 | -- | 1 | 2 | 3 |
| Harrison, Mississippi | 2 | 5 | 5 | 5 | 1 | 4 | 5 | 5 | 1 | 2 | 3 | 3 | 2 | 3 | 4 | 4 |
| Jackson, Mississippi | 7 | 13 | 14 | 14 | 3 | 6 | 8 | 8 | 6 | 11 | 12 | 13 | 6 | 10 | 12 | 13 |
| Mobile, Alabama | 13 | 18 | 19 | 19 | 4 | 9 | 10 | 10 | 8 | 12 | 12 | 13 | 9 | 12 | 13 | 13 |
| Baldwin, Alabama | 8 | 15 | 18 | 18 | 2 | 8 | 9 | 9 | 1 | 2 | 3 | 3 | 3 | 6 | 7 | 7 |
| Escambia, Florida | 1 | 6 | 9 | 10 | 1 | 4 | 6 | 6 | -- | 1 | 1 | 1 | -- | 2 | 2 | 3 |
| Okaloosa, Florida | -- | 1 | 2 | 2 | -- | 1 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | -- |
| Walton, Florida | -- | -- | 1 | 1 | -- | 1 | 1 | 1 | -- | -- | -- | 1 | -- | -- | -- | -- |
| Bay, Florida | -- | 2 | 3 | 3 | -- | 1 | 2 | 3 | -- | -- | -- | -- | -- | -- | -- | 1 |
| Gulf, Florida | -- | 1 | 3 | 4 | -- | -- | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | -- |
| Franklin, Florida | -- | -- | 1 | 2 | -- | -- | 1 | 1 | -- | -- | -- | -- | -- | -- | -- | -- |
| Dixie, Florida | -- | -- | -- | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Levy, Florida | -- | -- | -- | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| State Coastline | Conditional Probability of Contact[1] (%) | | | | | | | | | | | | | | | |
| Texas | -- | -- | -- | -- | -- | -- | -- | 1 | -- | -- | 1 | 2 | -- | -- | -- | 2 |
| Louisiana | -- | 6 | 8 | 9 | 3 | 17 | 30 | 35 | 3 | 25 | 36 | 36 | 2 | 18 | 29 | 33 |
| Mississippi | 9 | 20 | 22 | 22 | 5 | 12 | 15 | 15 | 8 | 15 | 18 | 19 | 8 | 15 | 18 | 20 |
| Alabama | 21 | 33 | 37 | 37 | 6 | 17 | 20 | 20 | 9 | 14 | 15 | 15 | 12 | 18 | 20 | 20 |
| Florida | 1 | 11 | 19 | 26 | 1 | 7 | 14 | 16 | -- | 1 | 3 | 3 | -- | 2 | 4 | 5 |

[1] Conditional probability refers to the probability of contact within the stated time period assuming that a spill has occurred (-- indicates <0.5%).

From Launch Point 2, potential shoreline contacts within 60 days range from Matagorda County, Texas, to Levy County, Florida. Based on statewide contact probabilities within 60 days, Louisiana has the highest likelihood of contact during summer, fall, and winter (ranging from 33% to 36% within 60 days), while Alabama has the highest probability of contact in spring (37% within 60 days). The model predicts potential contact with Mississippi shorelines in any season ranging from a 15% probability in summer to a 22% probability in spring (within 60 days of a spill). Texas shorelines are predicted to be potentially contacted only during summer, fall, or winter, with probabilities of contact 2% or less within 60 days. Florida shorelines are predicted to be potentially contacted during any season, with a probability up to 26% in spring. Based on the 60-day trajectories, counties or parishes with 10% or higher contact probability during any season include Plaquemines and St. Bernard Parishes in Louisiana, Jackson County in Mississippi, Mobile and Baldwin counties in Alabama, and Escambia County in Florida (**Table 5**).

OSRA is a preliminary risk assessment model. In the event of an actual oil spill, real-time monitoring and trajectory modeling would be conducted using current and wind data available from the rigs and permanent production structures in the area. Satellite and aerial monitoring of the plume and real-time trajectory modeling using wind and current data would continue on a daily basis to help position equipment and human resources throughout the duration of any major spill or uncontrolled release.

<u>Weathering</u>. Following an oil spill, several physical, chemical, and biological processes, collectively called weathering, interact to change the physical and chemical properties of the oil, influencing potential effects to marine organisms and ecosystems. The most important weathering processes include spreading, evaporation, dissolution, dispersion into the water column, formation of water-in-oil emulsions, photochemical oxidation, microbial degradation, adsorption to suspended particulate matter, and stranding on shore or sedimentation to the seafloor (National Research Council, 2003a).

Weathering decreases the concentration of oil and produces changes in its chemical composition, physical properties, and toxicity. The more toxic, light aromatic and aliphatic hydrocarbons are lost rapidly by evaporation and dissolution from a slick on the water surface. For example, the light, paraffinic crude oil spilled during the *Deepwater Horizon* incident lost approximately 55% of its weight to evaporation during the first 3 to 5 days while floating on the sea surface (Daling et al., 2014). Evaporated hydrocarbons are degraded rapidly by sunlight. Biodegradation of oil on the water surface and in the water column by marine bacteria removes first the n-alkanes and then the light aromatics from the oil. Other petroleum components are biodegraded more slowly. Photo-oxidation attacks mainly the medium and high molecular weight PAHs in the oil on the water surface.

<u>Spill Response</u>. All proposed activities and facilities in this EP will be covered by the Gulf of Mexico Regional OSRP submitted to BSEE by BP Exploration & Production Inc. (Operator No. 02481) on 15 August 2017 and approved on 7 September 2017.

BP's OSRP includes information about enhanced measures for responding to a spill in open water, near shore spill response, and shoreline spill response based on lessons learned from the *Deepwater Horizon* oil spill. In compliance with the requirements of 30 CFR 254 and related NTLs, BP's OSRP includes the following:

- Provisions to maintain access to a supply of dispersant and fire boom for use in the event of an uncontrolled, long-term blowout, for the length of time required to drill a relief well;
- Contingencies for maintaining an ongoing response for the length of time required to drill a relief well;
- A description of the measures and equipment necessary to maximize the effectiveness and efficiency of the response equipment used to recover the discharge on the water's surface. The description will include methods to increase encounter rates, the use of vessel tracking, and the use of remote sensing technologies;
- Information on remote sensing technology and equipment to be used to track oil slicks, including oil spill detection systems and remote thickness detection systems (such as X-band/infrared systems);
- Information pertaining to the use of vessel tracking systems and communication systems between response vessels and spotter personnel;
- A shoreline protection strategy that is consistent with applicable area contingency plans; and
- A discussion regarding strategies and plans related to source abatement and control for blowouts from drilling.

BP is a member of the Marine Spill Response Corporation, Clean Gulf Associates, and a client of the National Response Corporation. BP would utilize oil spill response organization personnel and equipment in the event of an oil spill in the Gulf of Mexico. Primary response equipment for the activation of BP's OSRP is located in Galveston and Corpus Christi in Texas; Houma, Lake Charles, Ft. Jackson, and Venice in Louisiana; Pascagoula in Mississippi; Mobile in Alabama; and Pensacola in Florida. The preplanned staging area for this EP is Port Fourchon, Louisiana.

See EP Appendix G for a detailed description of BP's OSRP and site-specific response for an oil spill associated with this project.

# B. Affected Environment

The project area is in the central Gulf of Mexico, 64 statute miles (103 km) from the nearest shoreline (Plaquemines Parish, Louisiana), 125 statute miles (200 km) from the onshore support base at Port Fourchon, Louisiana, and 167 statute miles (266 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the proposed wellsite is approximately 1,962 m (6,436 ft) (**Figure 2**).

The seafloor in the vicinity of the proposed wellsite is hummocky due to a sediment drape covering the margin of a shallow-buried mass transport deposit. The seafloor gradient is approximately 1.3 degrees to the east-southeast. The closest existing infrastructure to the proposed wellsite is an infield oil flowline approximately 23 m (80 ft) to the northwest, the Isabela Plem 2 approximately 27 m (90 ft) to the northwest, the Isabela flowline jumper approximately 30m (100 ft) to the west, and the existing MC 562-1 wellhead approximately 58 m (190 ft) to the northwest (BP, 2018). Based on the assessment of three-dimensional seismic seabed amplitudes and the findings from the geologic and archaeological assessment of deep-tow side scan sonar and sub-bottom profiler data, no geophysical evidence, hard bottoms or active hydrocarbon seeps were identified that could indicate the presence of high density chemosynthetic communities within 610 m (2,000 ft) of the proposed wellsite (BP, 2018).

A detailed description of the regional affected environment, including meteorology, oceanography, geology, air and water quality, benthic communities, threatened and endangered species, biologically sensitive resources, archaeological resources, socioeconomic conditions, and other marine uses is provided in (BOEM, 2012a, 2013, 2014, 2015, 2016b, 2017a, b). These regional descriptions remain valid and are incorporated by reference. General background information is presented in the following sections, and brief descriptions of each potentially affected resource, including site-specific and new information if available, are presented in **Section C**.

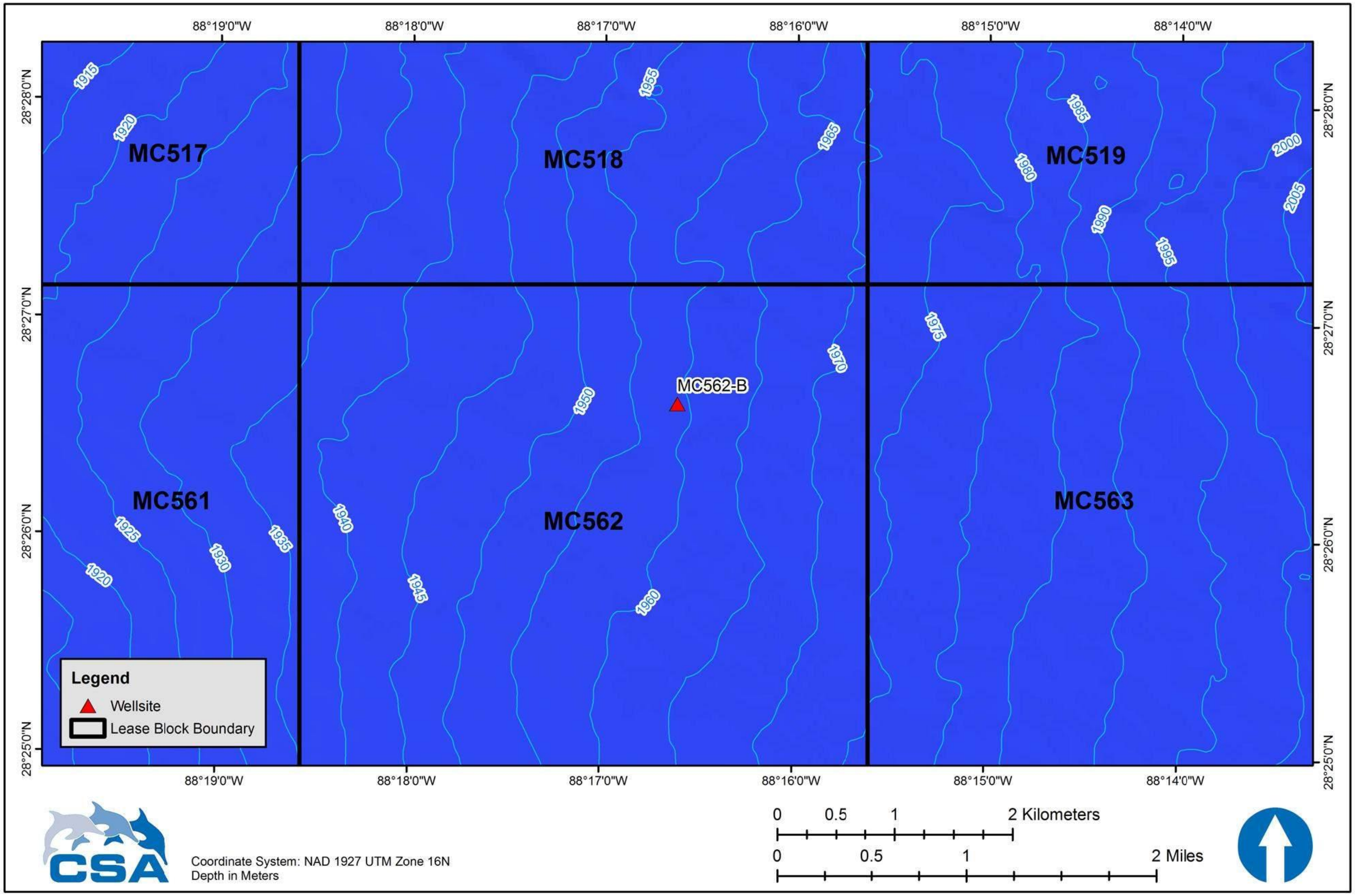


Figure 2. Bathymetric map of the surface hole location of the proposed wellsite in Mississippi Canyon Block 562.

# C. Impact Analysis

This section analyzes the potential direct and indirect impacts of routine activities and accidents. Impacts have been analyzed extensively in lease sale EISs for the Central and Western Gulf of Mexico Planning Areas (BOEM, 2013, 2014, 2015, 2016a, b, 2017a, b). The information in these documents is incorporated by reference in the EIA. Potential site-specific issues are addressed in this section, which is organized by the environmental resources identified in **Table 2** and addresses each potential IPF.

## C.1 Physical/Chemical Environment

### C.1.1 Air Quality

There are no site-specific air quality data for the project area due to the distance from shore. Because of the distance from shore-based pollution sources and the lack of sources offshore, air quality at the wellsite is expected to be good. The attainment status of federal OCS waters is unclassified because there is no provision in the Clean Air Act for classification of areas outside state waters (BOEM, 2012a).

In general, ambient air quality of coastal counties along the Gulf of Mexico is relatively good (BOEM, 2012a). As of March 2018, Mississippi, Alabama, and Florida Panhandle coastal counties are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2018). St. Bernard Parish in Louisiana is a nonattainment area for sulfur dioxide based on the 2010 standard. One coastal metropolitan area in Texas (Houston-Galveston-Brazoria) is a nonattainment area for 8-hour ozone, and one coastal metropolitan area in Florida (Tampa) is a nonattainment area for lead based on the 2008 standard and for sulfur dioxide based on the 2010 standard (USEPA, 2018).

As noted earlier, based on calculations made pursuant to applicable regulations, emissions from drilling activities are not expected to be significant. Therefore, the only potential effects to air quality would be from air pollutant emissions associated with routine operations and accidental spills (a small fuel spill or a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

#### Impacts of Air Pollutant Emissions

Air pollutant emissions are the only routine IPF likely to affect air quality. Offshore air pollutant emissions result primarily from the drilling operations and service vessels. These emissions occur mainly from combustion or burning of diesel and Jet-A aircraft fuel. The combustion of fuels occurs primarily in generators, pumps, or motors and from lighter fuel motors. Primary air pollutants typically associated with OCS activities are suspended PM, $SO_x$, $NO_x$, VOCs, and CO. As noted by BOEM (2017b), emissions from routine activities are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, anticipated emission rates, anticipated heights of emission sources, and the distance to shore of the proposed activities. The incremental contribution to cumulative impacts from activities similar to BP's proposed activities is not significant and is not expected to cause or contribute to a violation of NAAQS. Given the levels of expected emissions and the distance of the project from shore, emissions from the activities described in BP's proposed EP are not likely to contribute to violations of any NAAQS onshore.

Greenhouse gas emissions may contribute to climate change, with important effects on temperature, rainfall, frequency of severe weather, ocean acidification, and sea level rise (Intergovernmental Panel on Climate Change, 2014). Greenhouse gas emissions from this proposed project represent a negligible contribution to the total greenhouse gas emissions from reasonably foreseeable activities in the Gulf of Mexico area and are not expected to significantly alter or exceed any of the climate change impacts evaluated in the Programmatic EIS (BOEM, 2016a). Carbon dioxide ($CO_2$) and methane ($CH_4$) emissions from the project would constitute a small incremental contribution to greenhouse gas emissions from all OCS activities. According to Programmatic and OCS lease sale EISs (BOEM, 2016a, 2017a), estimated $CO_2$ emissions from OCS oil and gas sources are 0.4% of the U.S. total. Because of the distance from shore, routine operations in the project area are not expected to have any impact on air quality conditions along the coast, including nonattainment areas.

As noted in the lease sale EIS (BOEM, 2017a, b), emissions of air pollutants from routine activities in the Central Gulf of Mexico Planning Area are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission heights, emission rates, and the distance of these emissions from the coastline. The Air Quality Emissions Report indicates that the projected project emissions are below exemption levels set by the applicable regulations in 30 CFR 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants.

The Breton Wilderness Area, which is part of the Breton National Wildlife Refuge (NWR), is designated under the Clean Air Act as a Prevention of Significant Deterioration Class I air quality area. BOEM is required to notify the National Park Service and U.S. Fish and Wildlife Service (USFWS) if emissions from proposed projects may affect the Breton Class I area. Additional review and mitigation measures may be required for sources within 186 miles (300 km) of the Breton Class I area that exceed emission limits agreed upon by the administering agencies (National Park Service, 2010). The project area is approximately 87 statute miles (140 km)[2] from the Breton Wilderness Area. BP intends to comply with all BOEM requirements regarding air emissions.

### Impacts of a Small Fuel Spill

Potential impacts of a small spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a, 2015, 2016b, 2017a, b). The probability of a small spill would be minimized by BP's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of BP's OSRP is expected to reduce the potential impacts. EP Appendix G includes a detailed discussion of the spill response measures that would be employed. Given the open ocean location of the project area, the extent and duration of air quality impacts from a small spill would not be significant.

A small fuel spill would affect air quality near the spill site by introducing VOCs into the atmosphere through evaporation. The ADIOS2 model (see **Section A.9.2**) indicates that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

[2] Distance calculated based on the nearest point of block MC 562 to the Breton Wilderness Area.

A small fuel spill should not affect coastal air quality because the spill would not be expected to make landfall or reach coastal waters prior to breaking up (see **Section A.9.2**).

### Impacts of a Large Oil Spill

Potential impacts of a large oil spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a, 2015, 2016b, 2017a, b).

A large oil spill could potentially affect air quality by introducing VOCs into the atmosphere through evaporation from the slick. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of released VOCs. Additional air quality impacts could occur if response measures included *in situ* burning of floating oil. Burning would generate a plume of black smoke and result in emissions of $NO_x$, $SO_x$, CO, and PM as well as greenhouse gases. However, *in situ* burning would occur only after authorization from the USCG Federal On-Scene Coordinator and the Response Incident Command Team. This approval would also be based upon consultation with the regional response team, including the USEPA.

Because of the project area's location (64 statute miles [103 km]) from the nearest shoreline, most air quality impacts would occur in offshore waters with minimal chance to affect onshore air quality.

## C.1.2 Water Quality

There are no site-specific baseline water quality data for the project area. Due to the location of the proposed wellsite in deep, offshore waters, water quality is expected to be good, with low levels of contaminants. Deepwater areas in the northern Gulf of Mexico are relatively homogeneous with respect to temperature, salinity, and oxygen (BOEM, 2017a). Kennicutt (2000) noted that the deepwater region has little evidence of contaminants in the dissolved or particulate phases of the water column. Within the northern Gulf of Mexico, there are localized areas (termed natural seeps) that release natural seepage of oil, gas, and brines from sub-surface deposits into near surface sediments and up through the water column. No natural seeps were noted within 610 m (2,000 ft) of the proposed wellsite (BP, 2018).

IPFs that may affect water quality are effluent discharges associated with routine operations and two types of accidents – a small fuel spill and a large oil spill as discussed below.

### Impacts of Effluent Discharges

Discharges of treated SBM cuttings may produce temporary, localized increases in suspended solids in the water column around the drilling rig. In general, turbid water can be expected to extend between a few hundred meters and several kilometers down current from the discharge point for WBM and cuttings (Neff, 1987). SBMs will be collected on the rig and either reused by the vendor or transported to Port Fourchon, Louisiana for recycling and disposal at an approved facility. Cuttings wetted with SBMs and SBM discharges associated with weekly safety diverter valve testing on the mobile offshore drilling unit (MODU) are expected to be treated to SBM levels at or below NPDES requirements and discharged overboard at the drillsite in accordance with all NPDES permit limitations and requirements. After discharge, SBMs retained on cuttings would be expected to adhere tightly to the cuttings particles and, consequently, would not produce substantial turbidity as the cuttings sink through the water column (Neff et al., 2000). No persistent impacts on water quality in the project area are expected.

WBM and cuttings will be released at the seafloor during the initial well intervals before the marine riser is set, which allows returns to the surface. Excess cement slurry also will be released at the seafloor during casing installation for the riserless portion of the drilling operations.

Treated sanitary and domestic wastes, including those from support vessels, may have a transient effect on water quality in the immediate vicinity of the discharge. Treated sanitary and domestic wastes may have elevated levels of nutrients, organic matter, and chlorine but should dilute rapidly to undetectable levels within tens to hundreds of meters from the source. All NPDES permit limitations and requirements as well as USCG regulations (as applicable) are expected to be met during proposed activities; therefore, little or no impact on water quality from the overboard releases of treated sanitary and domestic wastes is anticipated.

Deck drainage includes all effluents resulting from rain, deck washings, and runoff from gutters and drains (including drip pans) in work areas. Rainwater that falls on uncontaminated areas of the drilling rig will flow overboard without treatment. However, rainwater that falls on the drilling rig deck and other areas such as chemical storage areas and places where equipment is exposed will be collected, and oil and water will be separated to meet NPDES permit requirements. Based on expected adherence to permit limits and applicable regulations, little or no impact on water quality from deck drainage is anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine; BOP hydraulic fluids; and uncontaminated cooling water, firewater, ballast water, bilge water, and other discharges of seawater and freshwater to which treatment chemicals have been added are expected to dilute rapidly and have little or no impact on water quality.

Support vessels will discharge treated sanitary and domestic wastes. These are not expected to have a significant impact on water quality in the vicinity of the discharges. Support vessel discharges are expected be in accordance with USCG and MARPOL 73/78 regulations and, as applicable, the NPDES Vessel General Permit, and therefore are not expected to cause significant impacts on water quality.

### Impacts of a Small Fuel Spill

Potential impacts of a small spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a, 2015, 2016b, 2017a, b). The probability of a small spill would be minimized by BP's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of BP's OSRP is expected to potentially help mitigate and reduce the impacts. EP Appendix G provides details on spill response measures in addition to the summary information provided in the EIA.

The water-soluble fractions of diesel are dominated by two- and three-ringed PAHs, which are moderately volatile (National Research Council, 2003a). The molecular weights of diesel oil constituents are light to intermediate and can be readily degraded by aerobic microbial oxidation. Diesel oil is much lighter than water (specific gravity is between 0.83 and 0.88, compared to 1.03 for seawater). When spilled on water, diesel oil spreads very quickly to a thin film of rainbow and silver sheens, except for marine diesel, which may form a thicker film of dull or dark colors. However, because diesel oil has a very low viscosity, it is readily dispersed into the water column when winds reach 5 to 7 knots or with breaking waves (NOAA, 2017a). It is possible for the diesel oil that is dispersed by wave action to form droplets that are small enough be kept in suspension and moved by the currents.

Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high suspended solid loads (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico.

The extent and persistence of water quality impacts from a small diesel fuel spill would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. It is estimated that more than 90% of a small diesel spill would evaporate or disperse within 24 hours (see **Section A.9.2**). The sea surface area covered with a very thin layer of diesel fuel would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. In addition to removal by evaporation, constituents of diesel oil are readily and completely degraded by naturally occurring microbes (NOAA, 2006, 2017a). Given the open ocean location of the project area, the extent and duration of water quality impacts from a small spill would not be significant.

### Impacts of a Large Oil Spill

Potential impacts of a large oil spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a, 2015, 2016b, 2017a, b).

Most of the spilled oil would be expected to form a slick at the surface, although information from the *Deepwater Horizon* incident indicates that submerged oil droplets can be produced when subsea dispersants are applied at the wellhead (Camilli et al., 2010, Hazen et al., 2010, NOAA, 2011a, 2011b, c). Dispersants would be applied only after approval from the USEPA and Regional Response Team Region 6.

The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of released VOCs. Weathering processes that affect spilled oil on the sea include adsorption (sedimentation), biodegradation, dispersion, dissolution, emulsification, evaporation, and photo oxidation. Most crude oil blends will emulsify quickly when spilled, creating a stable mousse that presents a more persistent cleanup and removal challenge (NOAA, 2017b).

Hazen et al. (2010) studied the impacts and fate of deepwater oil after the 2010 *Deepwater Horizon* incident. Results suggested that the potential exists for rapid intrinsic bioremediation (bacterial degradation) of subsea dispersed oil in the water column by deep-sea indigenous microbial activity without significant oxygen reduction (Hazen et al., 2010), although other studies showed that oil bioremediation caused oxygen drawdown in deep waters (Kessler et al., 2011, Dubinsky et al., 2013). Additional studies investigated the effects of deepwater dissolved hydrocarbon gases (e.g., methane, propane, ethane) and the microbial response to a deepwater oil spill. Results suggest deepwater dissolved hydrocarbon gases may promote rapid hydrocarbon respiration by bacterial blooms, thus priming indigenous bacterial populations for rapid hydrocarbon degradation of subsea oil (Kessler et al., 2011, Du and Kessler, 2012, Valentine et al., 2014). A recent study (Liu et al., 2017) identified water temperature, taxonomic composition of initial bacterial community, and dissolved nutrient levels as factors that may regulate oil degradation rates by deep-sea indigenous microbes.

Due to the project area being located approximately 64 statute miles (103 km) from the nearest shoreline (Plaquemines Parish, Louisiana), it is expected that most water quality impacts would occur in offshore waters, especially in the event of a spill lasting less than 30 days. The 30-day OSRA modeling (**Table 4**) indicates nearshore waters and embayments of Plaquemines Parish, Louisiana, is the coastal area with the most potential for water quality to be affected (5% probability within 10 days and 11% probability within 30 days). Other Louisiana shorelines may be affected within 10 days (Lafourche Parish), and shorelines in Louisiana and Florida could be affected within 30 days (1 to 11% conditional probability). The 60-day OSRA model predicts contact of shorelines between Matagorda County, Texas, and Levy County, Florida, with a maximum conditional probability of contact of 24% in Plaquemines Parish, Louisiana (**Table 5**) (BOEM, 2017c).

## C.2 Seafloor Habitats and Biota

The water depth at the proposed wellsite is approximately 1,962 m (6,436 ft). According to BOEM (2016a), existing information for the deepwater Gulf of Mexico indicates that the seafloor is composed primarily of soft sediments; exposed hard substrate habitats and associated biological communities are rare. The site clearance letter did not note the presence of hard bottom communities or potential seepage locations within 610 m (2,000 ft) of the proposed wellsite location (BP, 2018). The IPFs with potential impacts listed in **Table 2** are discussed below.

### C.2.1 Soft Bottom Benthic Communities

There are no site-specific benthic community data from the project area. However, data from the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Wei, 2006, Rowe and Kennicutt, 2009, Wei et al., 2010, Carvalho et al., 2013) can be used to describe typical baseline benthic communities in the area. **Table 6** summarizes data collected at two stations in water depths similar to those in the proposed project area.

Table 6. Baseline benthic community data from stations near the project area in similar depths sampled during the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Adapted from: Wei, 2006; Rowe and Kennicutt, 2009).

| Station | Water Depth (meters) | Abundance | | |
|---|---|---|---|---|
| | | Meiofauna (individuals $m^{-2}$) | Macroinfauna (individuals $m^{-2}$) | Megafauna (individuals $ha^{-1}$) |
| HiPro | 1,565 | 343,118 | 5,076 | -- |
| S37 | 2,387 | 291,179 | 2,192 | 1,451 |

Meiofaunal and megafaunal abundances from Rowe and Kennicutt (2009); macroinfaunal abundance from Wei (2006). -- = no data available.

Densities of meiofauna (animals passing through a 0.5-mm sieve but retained on a 0.062-mm sieve) at stations in the vicinity of the project area ranged from approximately 290,000 to 340,000 individuals $m^{-2}$ (**Table 6)** (Rowe and Kennicutt, 2009). Nematodes, nauplii, and harpacticoid copepods were the three dominant meiofaunal groups, accounting for about 90% of total abundance.

The benthic macroinfauna is characterized by small mean individual sizes and low densities, both of which reflect the meager primary production in surface waters of the Gulf of Mexico continental slope (Wei, 2006). Densities decrease exponentially with water depth. Based on an equation presented by Wei (2006), macroinfaunal densities in the water depth of the project area are expected to be approximately 1,589 individuals $m^{-2}$. Actual densities at the proposed project location are unknown, however macrofaunal densities at stations in the vicinity of the proposed wellsite ranged from approximately 2,200 to 5,100 individuals $m^{-2}$ (**Table 6**).

Polychaetes are typically the most abundant macroinfaunal group on the northern Gulf of Mexico continental slope, followed by amphipods, tanaids, bivalves, and isopods. Carvalho et al. (2013) found polychaete abundance to be higher in the central region of the northern Gulf of Mexico when compared to the eastern and western regions. Wei (2006) recognized four depth-dependent faunal zones (1 through 4), two of which are further subdivided. The project area is in Zone 2E, which extends from the Texas-Louisiana slope to the west Florida terrace. The most abundant species in this zone were the polychaetes *Aricidea suecica*, *Litocorsa antennata*, *Paralacydonia paradoxa*, and *Tharyx marioni*; and the bivalve *Heterodonta* spp. (Wei, 2006).

The megafaunal density from a station in the vicinity of the project area was 1,451 individuals $ha^{-1}$. Common megafauna included motile groups such as decapods, ophiuroids, holothurians, and demersal fishes as well as sessile groups such as sponges and anemones (Rowe and Kennicutt, 2009).

Bacteria are an important component in terms of biomass and cycling of organic carbon (Cruz-Kaegi, 1998). For example, in deep sea sediments, Main et al. (2015) observed that microbial oxygen consumption rates increased and bacterial biomass decreased with hydrocarbon contamination. Bacterial biomass at the depth range of the project area typically is about 1 to 2 g C $m^{-2}$ in the top 15 cm of sediments (Rowe and Kennicutt, 2009).

IPFs that potentially may affect benthic communities are physical disturbance to the seafloor, effluent discharges (drilling muds and cuttings), and potential effects from large oil spill resulting from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel is expected to float and dissipate on the sea surface.

### Impacts of Physical Disturbance to the Seafloor

In water depths such as those in the project area, DP drillships or semisubmersibles disturb the seafloor only around the wellbore (surface hole location) where the bottom template and BOP are located. Depending upon the specific well configuration, this area is generally about 0.25 ha (0.62 ac) per well (BOEM, 2012a).

The areal extent of these impacts from the DP drilling rig are expected to be small compared to the project area itself, and these types of soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway, 1988, Gallaway et al., 2003, Rowe and Kennicutt, 2009). Impacts from the physical disturbance of the seafloor during this project are expected be localized and will not likely have a significant impact on soft bottom benthic communities in the region.

### Impacts of Effluent Discharges

Drilling muds and cuttings are the only effluents that are likely to affect benthic communities. During initial well interval before the marine riser is set, cuttings and WBM will be released at the seafloor. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Cement slurry components typically include cement mix and some of the same chemicals used in WBM (Boehm et al., 2001). The main impacts will be burial and smothering of benthic organisms within several meters to tens of meters around the wellbore. Soft bottom sediments disturbed by cuttings, drilling muds, and cement slurry will eventually be recolonized through larval settlement and migration from adjacent areas. Because some deep-sea biota grow and reproduce slowly, recovery may require several years for the area within meters to tens of meters of the wellbore.

Discharges of washed SBM cuttings from the rig may affect benthic communities, primarily within several hundred meters of the wellsite. The fate and effects of SBM cuttings have been reviewed by Neff et al. (2000), and monitoring studies have been conducted in the Gulf of Mexico by Continental Shelf Associates (2004, 2006). In general, washed cuttings with adhering SBMs tend to clump together and form thick cuttings piles close to the drillsite. Areas of SBM cuttings deposition may develop elevated organic carbon concentrations and anoxic conditions (Continental Shelf Associates, 2006). Where SBM cuttings accumulate in concentrations of approximately 1,000 mg $kg^{-1}$ or higher, benthic infaunal communities may be adversely affected due to both the toxicity of the base fluid and organic enrichment (with resulting anoxia) (Neff et al., 2000). Infauna numbers may increase and diversity may decrease as opportunistic species that tolerate low oxygen and high $H_2S$ predominate (Continental Shelf Associates, 2006). As the base synthetic fluid is decomposed by microbes, the area will gradually return to pre-drilling conditions. Disturbed sediments will be recolonized through larval settlement and migration from adjacent areas.

The areal extent of impacts from drilling discharges will be small. Assuming a typical effect radius of 500 m (1,640 ft), the affected area around the wellsite would represent about 3% of the seafloor within a lease block. Soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway, 1988, Gallaway et al., 2003, Rowe and Kennicutt, 2009). Impacts from drilling discharges are expected to have no significant impact on soft bottom benthic communities in the region. It is expected that the rig will move to safe zones for short periods of time to perform maintenance on critical equipment. All discharges during these times are expected to meet NPDES permit requirements. No drilling related discharges are allowed during these periods when not on the well location.

### Impacts of a Large Oil Spill

The most likely effects of a subsea blowout on benthic communities would be within a few hundred meters of the wellsite. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300 m (984 ft) radius. While coarse sediments (sands) would probably settle at a rapid rate within 400 m (1,312 ft) from the blowout site, fine sediments (silts and clays) could be resuspended for more than 30 days and dispersed over a wider area. Based on previous studies, surface sediments at the project area are assumed to largely be silt and clay (Rowe and Kennicutt, 2009).

While impacts from a large oil spill are anticipated to be confined to the immediate vicinity of the wellhead, depending on the specific circumstances of the incident, additional benthic community impacts could extend beyond the immediate vicinity of the wellhead (BOEM, 2017a). During the *Deepwater Horizon* incident, subsurface oil plumes were reported in water depths of approximately 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010).

Oil contact could result in smothering or toxicity to benthic organisms. Any affected area would be recolonized by benthic organisms over a period of months to years (National Research Council, 1983). Reuscher et al. (2017) reported that four years after the spill, there was no difference in meiofauna or macrofauna abundance between impact and reference areas, though diversity was significantly lower in the impact areas.

### C.2.2 High-Density Deepwater Benthic Communities

As defined by NTL 2009-G40, high-density deepwater benthic communities are features or areas that could support high-density chemosynthetic communities, or features or areas that could support high-density hard bottom communities, including deepwater coral-dominated communities. Chemosynthetic communities were discovered in the central Gulf of Mexico in 1984 and have been studied extensively (MacDonald, 2002). Deepwater coral communities are also known from numerous locations in the Gulf of Mexico (Brooke and Schroeder, 2007, CSA International, 2007, Brooks et al., 2012). In the Gulf of Mexico, deepwater coral communities occur almost exclusively on exposed authigenic carbonate rock created by a biogeochemical (microbial) process.

Monitoring programs on the Gulf of Mexico continental slope have shown that benthic impacts from drilling discharges typically are concentrated within approximately 500 m (1,640 ft) of the wellsite, although detectable deposits may extend beyond this distance (Continental Shelf Associates, 2004, Neff et al., 2005, Continental Shelf Associates, 2006). In water depths such as those encountered in the project area, DP drilling vessels disturb the seafloor only around the wellbore where the bottom template and BOP are located. Depending on the specific well configuration, this area is approximately 0.25 ha (0.62 ac) per well (BOEM, 2012a).

The site clearance letter did not identify any features that could support high-density deepwater benthic communities within 610 m (2,000 ft) of the proposed wellsite (BP, 2018). The only IPF identified for this project that could affect high-density deepwater benthic communities is a large oil spill from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel would float and dissipate on the sea surface. Physical disturbance and effluent discharge are not considered IPFs for deepwater benthic communities because these communities are not expected to be present down current of the proposed wellsite.

#### Impacts of a Large Oil Spill

A large oil spill caused by a seafloor blowout could cause direct impacts (i.e., caused by the physical impacts of a blowout) on benthic communities within approximately 300 m (984 ft) of the wellhead (BOEM, 2012a, 2013). However, based on the site clearance letter for the proposed wellsite (BP, 2018), there are no seafloor features that could support high-density deepwater benthic communities within 610 m (2,000 ft) of the proposed wellsite. Therefore, this type of impact is not expected.

Additional benthic community impacts could extend beyond the immediate vicinity of the wellhead, depending on the specific circumstances (BOEM, 2017a). During the Macondo spill, subsurface plumes were reported at a water depth of approximately 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). Oil plumes that contact sensitive benthic communities before degrading could potentially impact the resource (BOEM, 2017a). Potential impacts on sensitive resources would be an integral part of the decision and approval process for the use of dispersants, and such approval would be obtained from the USEPA prior to the use of dispersants.

Potential impacts of oil on high-density deepwater benthic communities are discussed in recent EISs (BOEM, 2012a, 2015, 2016b, 2017a, b). Although chemosynthetic communities live among hydrocarbon seeps, natural seepage is very constant and occurs at low rates compared to the potential rates of oil release from a blowout. In addition, seep organisms also require unrestricted access to oxygenated water at the same time as exposure to hydrocarbon energy sources (MacDonald, 2002). Oil droplets or oiled sediment particles could come into contact with chemosynthetic organisms or deepwater corals in the vicinity of the spill site. Impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; reduction or loss of one or more commercial and recreational fishery habitats; or changes in sediment characteristics (BOEM, 2012a, 2017a, b).

### C.2.3 Designated Topographic Features

The project block is not within or near a designated topographic feature or a no-activity zone as identified in NTL 2009-G39. The nearest designated Topographic Feature Stipulation Block is located approximately 73 statute miles (117 km) west of the project area. There are no IPFs associated with routine operations that could cause impacts to designated topographic features.

Due to the distance from the project area, it is unlikely that designated topographic features could be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf.

### C.2.4 Pinnacle Trend Area Live Bottoms

The project area is not covered by the Live Bottom (Pinnacle Trend) Stipulation. As defined by NTL 2009-G39, the nearest Pinnacle Stipulation Block is located approximately 51 statute miles (82 km) north of the project area. There are no IPFs associated with routine operations that could cause impacts to pinnacle trend area live bottoms due to the distance from the project area.

Due to the distance from the project area, it is unlikely that pinnacle trend live bottom areas would be affected by an accidental spill. A small fuel spill would float on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf.

### C.2.5 Eastern Gulf Live Bottoms

The project area is not covered by the Live Bottom (Low-Relief) Stipulation, which applies to seagrass communities and low-relief hard bottom reef within the Eastern Gulf of Mexico Planning Area leases in water depths of 100 m (328 ft) or less and portions of Pensacola and Destin Dome Area blocks in the Central Gulf of Mexico Planning Area. The nearest block covered by the Live Bottom Stipulation, as defined by NTL 2009-G39, is located approximately 70 statute miles (113 km) north-northeast of the project area. There are no IPFs associated with routine operations that could cause impacts to eastern Gulf live bottom areas due to the distance from the project area.

Because of the distance from the project area, it is unlikely that Eastern Gulf live bottom areas would be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf.

## C.3 Threatened, Endangered, and Protected Species and Critical Habitat

This section discusses species listed as endangered or threatened under the Endangered Species Act (ESA). In addition, it includes all marine mammal species in the region, which are protected under the Marine Mammal Protection Act (MMPA).

Endangered or threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in **Table 7**. The table also indicates the location of critical habitat (if designated in the Gulf of Mexico). Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. The National Marine Fisheries Service (NMFS) has jurisdiction for ESA-listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of Mexico. The USFWS has jurisdiction for ESA-listed birds, the West Indian manatee, and sea turtles while on their nesting beaches.

Coastal endangered or threatened species that may occur along the northern Gulf Coast include the West Indian manatee, Piping Plover, Whooping Crane, Gulf sturgeon, and four subspecies of *Peromyscus* beach mouse. Critical habitat has been designated for all of these species as indicated in **Table 7** and discussed in individual sections.

Table 7. Federally listed endangered and threatened species potentially occurring in the project area and along the northern Gulf Coast.

| Species | Scientific Name | Status | Potential Presence | | Critical Habitat Designated in Gulf of Mexico |
|---|---|---|---|---|---|
| | | | Project area | Coastal | |
| **Marine Mammals** | | | | | |
| Bryde's whale | *Balaenoptera edeni*[a] | P | X | -- | None |
| Sperm whale | *Physeter macrocephalus* | E | X | -- | None |
| West Indian manatee | *Trichechus manatus*[b] | T | -- | X | Florida (Peninsular) |
| **Sea Turtles** | | | | | |
| Loggerhead turtle | *Caretta caretta* | T,E[c] | X | X | Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida; Sargassum habitat including most of the central & western Gulf of Mexico. |
| Green turtle | *Chelonia mydas* | T | X | X | None |
| Leatherback turtle | *Dermochelys coriacea* | E | X | X | None |
| Hawksbill turtle | *Eretmochelys imbricata* | E | X | X | None |
| Kemp's ridley turtle | *Lepidochelys kempii* | E | X | X | None |
| **Birds** | | | | | |
| Piping Plover | *Charadrius melodus* | T | -- | X | Coastal Texas, Louisiana, Mississippi, Alabama, and Florida |
| Whooping Crane | *Grus americana* | E | -- | X | Coastal Texas (Aransas National Wildlife Refuge) |
| **Fishes and Sharks** | | | | | |
| Oceanic whitetip shark | *Carcharhinus longimanus* | T | X | -- | None |
| Gulf Sturgeon | *Acipenser oxyrinchus desotoi* | T | -- | X | Coastal Louisiana, Mississippi, Alabama, and Florida |
| **Invertebrates** | | | | | |
| Elkhorn coral | *Acropora palmata* | T | -- | X | Florida Keys and the Dry Tortugas |
| Lobed star coral | *Orbicella annularis* | T | -- | X | None |
| Mountainous star coral | *Orbicella faveolata* | T | -- | X | None |
| Boulder star coral | *Orbicella franksi* | T | -- | X | None |
| **Terrestrial Mammals** | | | | | |
| Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew) | *Peromyscus polionotus* | E | -- | X | Alabama and Florida (Panhandle) beaches |

E = endangered; P = Proposed; T = threatened; X = potentially present; -- = not present.

[a] Gulf of Mexico Bryde's whales are protected by the Marine Mammal Protection Act. There is currently a proposed rule to list this stock as 'endangered' under the Endangered Species Act.

[b] There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (*T. m. manatus*), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico. On 30 March 2-17, the USFWS announced the West Indian manatee, including the Florida manatee subspecies, was reclassified as threatened.

[c] The loggerhead turtle is composed of nine distinct population segments (DPS). The only DPS that may occur in the project area (Northwest Atlantic DPS) is listed as threatened (76 *Federal Register* [FR] 58868; 22 September 2011).

The sperm whale and five species of sea turtles are the only endangered or threatened species likely to occur in or near the project area. The listed sea turtles include the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, loggerhead turtle, and green turtle (Pritchard, 1997). Effective 11 August 2014, NMFS has designated certain marine areas as critical habitat for the

Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle (see **Section C.3.4**). No critical habitat has been designated in the Gulf of Mexico for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, the sperm whale, or the oceanic whitetip shark. Five endangered mysticetes (blue whale, fin whale, humpback whale, North Atlantic right whale, and sei whale) have been reported in the Gulf of Mexico, but are considered rare or extralimital (Würsig et al., 2000). These species are not included in the most recent NMFS stock assessment report (Waring et al., 2016, Hayes et al., 2017) nor in the most recent BOEM multisale EIS (BOEM, 2017a); therefore, they are not considered further in the EIA.

Four threatened coral species are known from the northern Gulf of Mexico: elkhorn coral (*Acropora palmata*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), and boulder star coral (*Orbicella franksi*) (NOAA, 2017c). None of these species are expected to be present in the project area (see **Section C.3.9**).

There are no other endangered animals or plants in the Gulf of Mexico that are reasonably likely to be adversely affected by either routine or accidental events. Other species occurring at certain locations in the Gulf of Mexico such as the smalltooth sawfish (*Pristis pectinata*) and Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*) are remote from the project area and highly unlikely to be affected. The IPFs with potential impacts listed in **Table 2** are discussed below.

### C.3.1 Sperm Whale (Endangered)

The only endangered marine mammal likely to be present at or near the project area is the sperm whale (*Physeter macrocephalus*). Resident populations of sperm whales occur within the Gulf of Mexico; a species description is presented in the recovery plan for this species (NMFS, 2010a). Gulf of Mexico sperm whales are classified as an endangered species and a strategic stock (defined as a stock that may have unsustainable human-caused impacts) by NOAA Fisheries (Waring et al., 2016). A strategic stock is defined by the MMPA as a marine mammal stock that meets the following criteria:

- The level of direct human-caused mortality exceeds the potential biological removal level;
- Based on the best available scientific information, is in decline and is likely to be listed as a threatened species under the ESA within the foreseeable future; or
- Listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA.

Current threats to sperm whale populations worldwide are discussed in a final recovery plan for the sperm whale recently published by NMFS (2010a). Threats are defined as "any factor that could represent an impediment to recovery," and include fisheries interactions, anthropogenic marine sound, vessel interactions, contaminants and pollutants, disease, injury from marine debris, research, predation and natural mortality, direct harvest, competition for resources, loss of prey base due to climate change and ecosystem change, and cable laying. In the Gulf of Mexico, the impacts from many of these threats are identified as either low or unknown (BOEM, 2012a).

In 2013, NMFS conducted a status review to consider designating the Gulf of Mexico population of the sperm whale as a DPS under the ESA, but concluded that the designation of a Gulf of Mexico DPS for sperm whales was not warranted (78 FR 68032).

The distribution of sperm whales in the Gulf of Mexico is correlated with mesoscale physical features such as eddies associated with the Loop Current (Jochens et al., 2008). Sperm whale populations in the north-central Gulf of Mexico are present throughout the year (Davis et al., 2000a). Results of a multi-year tracking study show female sperm whales are typically concentrated along the upper continental slope between the 200- and 1,000-m (656 and 3,280 ft) depth contours (Jochens et al., 2008). Male sperm whales were more variable in their movements and were documented in water depths greater than 3,000 m (9,843 ft). Generally, groups of sperm whales sighted in the Gulf of Mexico during the MMS-funded Sperm Whale Seismic Study (SWSS) of mixed-sex groups comprising adult females with juveniles, and groups of bachelor males. Typical group size for mixed groups was 10 individuals (Jochens et al., 2008).

A review of sighting reports from seismic mitigation surveys in the Gulf of Mexico conducted over a 6-year period found a mean group size for sperm whales of 2.5 individuals (Barkaszi et al., 2012). In these mitigation surveys, sperm whales were the most common large cetacean encountered. The SWSS results also showed that sperm whales transit through the vicinity of the project area. Movements of satellite-tracked individuals suggest that this area of the continental slope is within the home range of the Gulf of Mexico population (within the 95% utilization distribution) (Jochens et al., 2008).

IPFs that may potentially affect sperm whales include drilling rig presence, marine sound, and lights; support vessel and helicopter marine sound; support vessel strikes; and two types of accidents – a small fuel spill and a large oil spill. Effluent discharges are likely to have negligible impacts on sperm whales due to rapid dilution, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these marine mammals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on sperm whales.

### Impacts of Drilling Rig Presence, Marine Sound, and Lights

Noise from routine drilling activities has the potential to disturb individuals or groups of sperm whales or mask the sounds they would normally produce or hear. Behavioral responses to noise by marine mammals vary widely and overall, are short-term and include, temporary displacement or cessation of feeding, resting, or social interactions (NMFS, 2009a, Gomez et al., 2016). Additionally, behavioral changes resulting from auditory masking sounds may induce an animal to produce more calls, longer calls, or shift the frequency of the calls. For example, masking caused by vessel noise was found to result in a reduced number of whale calls in the Gulf of Mexico (Azzara et al., 2013).

NMFS (2016) lists sperm whales in the same hearing group (i.e., mid-frequency cetaceans) as dolphins, toothed whales, beaked whales, and bottlenose whales (estimated hearing range from 150 Hz to 160 kHz). Sperm whale sounds generally consist of clicks that have a bandwidth of 100 Hz to 30 kHz (Erbe et al., 2017). Acoustic energy peaks at around 15 kHz, and is generally concentrated below 10 kHz, although diffuse energy up to and past 20 kHz is common (Weilgart and Whitehead, 1993, Goold and Jones, 1995, Møhl et al., 2003, Erbe et al., 2017). Source levels of clicks are generally 186 ± 0.9 dB re 1 $\mu Pa_{rms}$ m with extremes up to 236 dB re 1 $\mu Pa_{rms}$ m (Møhl et al., 2003, Mathias et al., 2013). Noise produced by drilling rigs, DP thrusters, and drilling operations are all classified as non-impulsive sound source and are within the hearing frequency sensitivity of sperm whales. As discussed in **Section A.1**, noise from offshore operations can produce broadband (10Hz to 10kHz) sound pressure levels of approximately

190 dB re 1 µPa m (Hildebrand, 2005). Therefore, vessel-related noise is likely to be heard by sperm whales.

Animals can determine the direction from which a sound arrives based on cues, such as differences in arrival times, sound levels, and phases at the two ears. Thus, an animal's directional hearing capabilities have a bearing on its vulnerability to masking (National Research Council, 2003b). It is expected that, due to the relatively stationary nature of the proposed activities, sperm whales would move away from the proposed operations area, and noise levels that could cause auditory injury would be avoided. However, observations of sperm whales near offshore oil and gas operations suggest an inconsistent response to anthropogenic marine sound (Jochens et al., 2008).

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar marine sound sources. Drilling-related marine sound associated with this project will contribute to increases in the ambient marine sound environment of the Gulf of Mexico, but it is not expected in amplitudes sufficient to result in auditory injuries to sperm whales. The proposed activity may cause disturbance effects, primarily avoidance or temporary displacement from the project area. Drilling rig lighting and presence are not identified as IPFs for sperm whales (NMFS, 2007, BOEM, 2016a, 2017a, b).

#### Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb sperm whales, and there is also a risk of vessel strikes, which are identified as a threat in the recovery plan for this species (NMFS, 2010a). To reduce the potential for vessel strikes, BOEM issued BOEM-2016-G01. This NTL recommends that vessel operators and crews receive protected species identification training. Vessel operators are required to maintain a vigilant watch for and report sightings of any injured or dead protected species. When whales are sighted, vessel operators and crews are required to attempt to maintain a distance of 91 m (300 ft) or greater from the sighted animal whenever possible. Vessel operators are required to reduce vessel speed to 10 knots or less, if safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel. Compliance with this NTL is expected to minimize the likelihood of vessel strikes as well as reduce the chance for disturbing sperm whales.

NMFS (2007) analyzed the potential for vessel strikes and harassment of sperm whales. With implementation of the mitigation measures in NTL BOEM-2016-G01, NMFS concluded that the observed avoidance of passing vessels by sperm whales is an advantageous response to avoid a potential threat and is not expected to result in any significant effect on migration, breathing, nursing, breeding, feeding, or sheltering to individuals, or have any consequences at the population level. With implementation of the vessel strike avoidance measures requirement to maintain a distance of 91 m (300 ft) from sperm whales, the NMFS concluded that the potential for harassment of sperm whales would be reduced to insignificant levels.

Support helicopter traffic also has the potential to disturb sperm whales. Smultea et al. (2008) documented responses of sperm whales offshore Hawaii to fixed wing aircraft flying at an altitude of 245 m (800 ft). A reaction to the initial pass of the aircraft was observed during 3 (12%) of 24 sightings. All three reactions consisted of a hasty dive and occurred at less than 360 m (1,180 ft) lateral distance from the aircraft. Additional reactions were seen when aircraft circled certain whales to make further observations. Based on other studies of cetacean responses to sound, Smultea et al. (2008) concluded that the observed reactions to brief overflights by the aircraft were short-term and limited to behavioral disturbances.

While flying offshore in the Gulf of Mexico, support helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. In the event that a whale is seen during transit, the helicopter will not approach or circle the animals. Although responses are possible (Smultea et al., 2008), NMFS (2007) concluded that this helicopter flight altitude would minimize the potential for disturbing sperm whales.

### Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2007) and BOEM (2017a, b). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011) with discussions germane to the Gulf of Mexico populations concerning composition and fate of petroleum and spill-treating agents in the marine environment, aspects of cetacean ecology, and physiological and toxic effects of oil on cetaceans. For this EP, there are no unique site-specific issues with respect to spill impacts on these animals that were not analyzed in the previous documents.

A small fuel spill in offshore waters would produce a thin sheen on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and marine sound of response vessels and aircraft (MMC, 2011). However, due to the limited areal extent and short duration of water quality impacts from a small fuel spill as well as the mobility of sperm whales, no significant impacts would be expected.

### Impacts of a Large Oil Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2007) and BOEM (2017a, b). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). For this EP, there are no unique site-specific issues with respect to spill impacts on sperm whales.

Impacts of oil spills on sperm whales can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, and dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey; and stress from the activities and marine sound of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Hayes et al., 2017). Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals, including displacement from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sperm whales and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels would operate in accordance with NTL BOEM-2016-G01 to reduce the potential for striking or disturbing these animals.

### C.3.2 West Indian Manatee (Threatened)

Most of the Gulf of Mexico manatee (*Trichechus manatus*) population is located in peninsular Florida, but manatees have been seen as far west as Texas during the summer (U.S. Fish and Wildlife Service, 2001). Critical habitat has been designated in southwest Florida. Manatee sightings in Louisiana have increased as the species extends its presence farther west of Florida in the warmer months (Hieb et al., 2017). Manatees are typically found in coastal and riverine habitats, but have rarely been seen in deepwater areas, usually in colder months when they seek refuge from colder coastal waters (U.S. Fish and Wildlife Service, 2001, Fertl et al., 2005). A species description is presented in the West Indian manatee recovery plan (U.S. Fish and Wildlife Service, 2001).

IPFs that potentially may affect manatees include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect manatees, as the project area is approximately 64 statute miles (103 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up. Compliance with BSEE-NTL 2015-G03 (see **Table 1**) is expected to minimize the potential for marine debris-related impacts on manatees.

#### Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb manatees, and there is also a risk of vessel strikes, which are identified as a threat in the recovery plan for this species (U.S. Fish and Wildlife Service, 2001). Manatees are expected to be limited to inner shelf and coastal waters, and impacts are expected to be limited to transits of these vessels and helicopters through these waters. To reduce the potential for vessel strikes, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessel operators and that vessels slow down or stop their vessel to avoid striking protected species. The NTL also requires that operators and crews maintain a vigilant watch for marine mammals and report sightings of any injured or dead protected species. Compliance with this NTL is expected to minimize the likelihood of vessel strikes, and no significant impacts on manatees are expected.

Dependent on flight altitude, helicopter traffic also has the potential to disturb manatees. Rathbun (1988) reported that manatees were disturbed more by helicopters than by fixed-wing aircraft; however, the helicopter was flown at relatively low altitudes of 20 to 160 m (66 to 525 ft). Helicopters used in support operations maintain a minimum altitude of 213 m (700 ft) while in transit offshore, 305 m (1,000 ft) over unpopulated areas or across coastlines, and 610 m (2,000 ft) over populated areas and sensitive habitats such as wildlife refuges and park properties. In addition, guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 91 m (300 ft) of marine mammals (BOEM, 2017a). This mitigation measure will minimize the potential for disturbing manatees, and no significant impacts are expected.

### Impacts of a Large Oil Spill

The OSRA results summarized in **Table 4** predict that Plaquemines Parish in Louisiana is the coastal area most likely to be affected (5% probability within 10 days; and 11% probability within 30 days). Other Louisiana shorelines (Lafourche Parish) may be affected within 10 days, and shorelines in Mississippi, Alabama, and Florida could be affected within 30 days. There is no manatee critical habitat designated in these areas, and the number of manatees potentially present is a small fraction of the population residing in peninsular Florida. The 60-day OSRA modeling (**Table 5**) predicts that shorelines between Matagorda County, Texas, and Levy County, Florida, may be contacted within 60 days of a spill. This range does not include any areas of manatee critical habitat.

In the event that manatees were exposed to oil, effects could include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, dispersants) (MMC, 2011). Direct physical and physiological effects can include asphyxiation, acute poisoning, lowering of tolerance to other stress, nutritional stress, and inflammation from infection (BOEM, 2017a). Indirect impacts include stress from the activities and noise of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing prey foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event that a large spill reached coastal waters where manatees were present, the level of vessel and aircraft activity associated with spill response could disturb manatees and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels would be expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking or disturbing these animals, and therefore no significant impacts are expected.

## C.3.3 Non-Endangered Marine Mammals (Protected)

Excluding the two endangered or threatened species that have been cited previously, there are 21 additional species of marine mammals that may be found in the Gulf of Mexico, including 1 species of mysticete whale, dwarf and pygmy sperm whales, 4 species of beaked whales, and 14 species of delphinid whales (dolphins). All marine mammals are protected species under the MMPA. The most common non-endangered cetaceans in the deepwater environment are small odontocetes such as the pantropical spotted dolphin, spinner dolphin, and bottlenose dolphin. A brief summary is presented below, and additional information on these groups is presented by BOEM (2017a).

<u>Bryde's Whale</u>. The Bryde's whale (*Balaenoptera edeni*) is the only year-round resident baleen whale in the northern Gulf of Mexico. In 2014, a petition was submitted to designate the northern Gulf of Mexico population as a DPS and list it as endangered under the ESA (Natural Resources Defense Council, 2014). This petition received a 90-day positive finding by NMFS in 2015 and is currently under consideration for listing. The Bryde's whale is most frequently sighted between the 100 m (328 ft) and 1,000 m (3,280 ft) isobaths (Davis and Fargion, 1996,

Davis et al., 2000a, Waring et al., 2016). Most sightings and acoustic detections have been made in the DeSoto Canyon region and off western Florida, although there have been some in the west-central portion of the northeastern Gulf. Based on the available data, it is possible that Bryde's whales could occur in the project area.

Dwarf and pygmy sperm whales. At sea, it is difficult to differentiate dwarf sperm whales (*Kogia sima*) from pygmy sperm whales (*Kogia breviceps*), and sightings are often grouped together as *Kogia* spp. Both species have a worldwide distribution in temperate to tropical waters. In the Gulf of Mexico, both species occur primarily along the continental shelf edge and in deeper waters off the continental shelf (Mullin et al., 1991, Mullin, 2007, Waring et al., 2016). Either species could occur in the project area.

Beaked whales. Four species of beaked whales are known to occur in the Gulf of Mexico: Blainville's beaked whale (*Mesoplodon densirostris*), Sowerby's beaked whale (*Mesoplodon bidens*), Gervais' beaked whale (*Mesoplodon europaeus*), and Cuvier's beaked whale (*Ziphius cavirostris*). Stranding records (Würsig et al., 2000) as well as passive acoustic monitoring in the Gulf of Mexico (Hildebrand et al., 2015) suggest that Gervais' beaked whale and Cuvier's beaked whale are the most common species in the region. The Sowerby's beaked whale is considered extralimital, with only one document stranding in the Gulf of Mexico (Bonde and O'Shea, 1989). Blainville's beaked whales are rare, with only four documented strandings in the northern Gulf of Mexico (Würsig et al., 2000).

Due to the difficulties of at sea identification, beaked whales in the Gulf of Mexico are identified either as Cuvier's beaked whales or are grouped into an undifferentiated species complex (*Mesoplodon* spp.). In the northern Gulf of Mexico, they are broadly distributed in water depths greater than 1,000 m (3,281 ft) over lower slope and abyssal landscapes (Davis et al., 2000a). Any of these species could occur in the project area (Waring et al., 2016).

Delphinids. Fourteen species of delphinids are known from the Gulf of Mexico, including Atlantic spotted dolphin (*Stenella frontalis*), bottlenose dolphin (*Tursiops truncatus*), Clymene dolphin (*Stenella clymene*), false killer whale (*Pseudorca crassidens*), Fraser's dolphin (*Lagenodelphis hosei*), killer whale (*Orcinus orca*), melon-headed whale (*Peponocephala electra*), pantropical spotted dolphin (*Stenella attenuata*), pygmy killer whale (*Feresa attenuata*), short-finned pilot whale (*Globicephala macrorhynchus*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), spinner dolphin (*Stenella longirostris*), and striped dolphin (*Stenella coeruleoalba*). Any of these species could occur in the project area (Waring et al., 2016).

The bottlenose dolphinis a common inhabitant of the northern Gulf of Mexico, particularly within continental shelf waters. There are two ecotypes of bottlenose dolphins, a coastal form and an offshore form, which are genetically isolated from each other (Waring et al., 2016). The offshore form of the bottlenose dolphin may occur within the project area. Inshore populations of coastal bottlenose dolphins in the northern Gulf of Mexico are separated into 31 geographically distinct population units, or stocks, for management purposes by NMFS (Hayes et al., 2017).

IPFs that potentially may affect non-endangered marine mammals include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents – a small fuel spill and a large oil spill. Effluent discharges are likely to have negligible impacts on marine mammals due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of marine mammals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on marine mammals.

**Impacts of Drilling Rig Presence, Marine Sound, and Lights**

The presence of the drilling rig presents an attraction to pelagic food sources that may attract cetaceans. Some odontocetes have shown increased feeding activity around lighted platforms at night (Todd et al., 2009). Therefore, prey congregation could pose an attraction to protected species that exposes them to higher levels or longer durations of noise that might otherwise be avoided. Drilling and support vessel presence and lighting are not considered as IPFs for marine mammals (BOEM, 2017a).

Noise from routine drilling and well completion operations has the potential to disturb marine mammals. As discussed in **Section A.1,** noise impacts would be expected at greater distances when DP thrusters are in use than with vessel and drilling noise alone and are dependent on variables relating to sea state conditions, thruster type and usage. Three functional hearing groups are represented in the 21 non-endangered cetaceans found in the Gulf of Mexico. Eighteen of the 20 odontocete species are considered to be in the mid-frequency functional hearing group, two congeners (*Kogia* spp.) are in the high frequency functional hearing group, and one species (Bryde's whale) is in the low frequency functional hearing group (NMFS, 2016). Thruster and drilling noise will affect each group differently depending on the frequency bandwidths produced by operations. Generally, noise produced by drilling rigs on DP is dominated by frequencies below 10 kHz. Thus, drilling rig DP sound sources are out of range for the high frequency group whereas the low frequency group is more likely to be disturbed by the low frequency output of the drilling sound sources.

For mid frequency cetaceans exposed to a non-impulsive source (like drilling operations), permanent threshold shifts are estimated to occur when the mammal has received a cumulative exposure level of 198 dB re 1 $\mu Pa^2 \cdot s$ over a 24-hour period. Similarly, temporary threshold shifts are estimated to occur when a mammal has received a cumulative noise exposure level of 178 dB re 1 $\mu Pa^2 \cdot s$ over a 24-hour period. For low frequency cetaceans, specifically the Bryde's whale, permanent and temporary threshold shift onset is estimated to occur at 199 dB re 1 $\mu Pa^2 \cdot s$ and 179 re 1 $\mu Pa^2 \cdot s$, respectively. Based on transmission loss calculations (see Urick, 1983), open water propagation of noise produced by typical sources with DP thrusters in use during drilling is not expected to produce received levels greater than 160 dB re 1 μPa beyond 82 ft (25 m) from the source. Due to the short propagation distance of high sound pressure levels, the transient nature of marine mammals and the stationary nature of drilling activities, it is not expected that any marine mammals will receive exposure levels necessary for the onset of auditory threshold shifts.

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar sources. Marine mammal species in the northern Gulf of Mexico have been exposed to noise from anthropogenic sources for a long period of time and over large geographic areas and likely do not represent a naïve population with regard to sound (National

Research Council, 2003b). It is expected that this project would represent a small, temporary contribution to the overall noise regime, and any short-term behaviorial impacts are not expected to be biologically significant to marine mammal populations.

NOAA Fisheries West Coast Region (2018) presents criteria that are used in the interim to determine behavioral disturbance thresholds for marine mammals and are applied equally across all functional hearing groups. Received sound pressure levels of 120 dB re 1 µPa from a non-impulsive source are considered high enough to elicit a behavioral reaction in some marine mammal species. The 120 dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment.

### Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb marine mammals, and there is also a risk of vessel strikes. Data concerning the frequency of vessel strikes are presented by BOEM (2012a). To reduce the potential for vessel strikes, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessels operators and that vessel slow down or stop their vessel to avoid striking protected species. The NTL also requires that operators and crews maintain a vigilant watch for marine mammals and report sightings of any injured or dead protected species. Vessel operators and crews are required to attempt to maintain a distance of 91 m (300 ft) or greater when whales are sighted and 45 m (150 ft) when small cetaceans are sighted. When cetaceans are sighted while a vessel is underway, vessels must attempt to remain parallel to the animal's course and avoid excessive speed or abrupt changes in direction until the cetacean has left the area. Vessel operators are required to reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. These mitigation measures are only effective during daylight hours, or in sea and weather conditions where cetaceans are sighted. Compliance with NTL BOEM-2016-G01 (see **Table 1**) is expected to minimize the likelihood of vessel strikes as well as reduce the chance for disturbing marine mammals during these periods.

Aircraft traffic has the potential to disturb marine mammals (Würsig et al., 1998). However, while flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. In addition, guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 91 m (300 ft) of marine mammals (BOEM, 2012a, 2016a). Maintaining this flight altitude will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2017a).

### Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by BOEM (2017a, b). Oil impacts on marine mammals in general are discussed by Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues with respect to spill impacts on non-listed cetaceans.

The probability of a fuel spill is expected to be minimized by BP's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of BP's OSRP is expected to lessen the potential for impacts on marine mammals. EP Appendix G provides detail on spill response measures, and those measures are summarized in the EIA. Given the open ocean location of the project area, the limited duration of a small spill, and response efforts, it is expected that any impacts would be brief and minimal.

A small fuel spill in offshore waters would produce a thin sheen on the water surface and introduce the concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and noise of response vessels and aircraft (MMC, 2011). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. A small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up (**Section A.9.1**). Therefore, due to the limited areal extent and short duration of water quality impacts from a small fuel spill as well as the mobility of marine mammals, no significant impacts would be expected.

#### Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed by BOEM (2017a, b). For this EP, there are no unique site-specific issues. Impacts of oil spills on marine mammals can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey.

Complications of the above may lead to dysfunction of immune (DeGuise et al., 2017) and reproductive systems (Kellar et al., 2017), physiological stress, declining physical condition, and death (MMC, 2011). Indirect impacts can include stress from the activities and noise of response vessels and aircraft. Behavioral responses can include displacement of animals from prime habitat (McDonald et al., 2017), disruption of social structure, change in prey availability and foraging distribution or patterns, change in reproductive behavior/productivity, and change in movement patterns or migration (MMC, 2011).

In the event of a large spill, response activities that may impact marine mammals include increased vessel traffic, use of dispersants, and remediation activities (e.g., controlled burns, skimmers, boom, etc.) (BOEM, 2017a). The increased level of vessel and aircraft activity associated with spill response could disturb marine mammals, potentially resulting in behavioral changes. The large number of response vessels could result in vessel strikes, entanglement or other injury, or stress. Response vessels would operate in accordance with NTL BOEM-2016-G01 to reduce the potential for striking or disturbing these animals, and therefore no significant impacts are expected. The application of dispersants greatly reduces exposure risks to marine mammals as the dispersants would remove oil from the surface thereby reducing the risk of contact and rendering it less likely to adhere to skin, baleen plates, or other body surfaces (BOEM, 2017a, b).

### C.3.4 Sea Turtles (Endangered/Threatened)

Five species of endangered or threatened sea turtles may be found near the project area. Endangered species include the leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) turtles, while the North Atlantic DPS of the green turtle (*Chelonia mydas*) is listed as threatened. The DPS of loggerhead turtles (*Caretta caretta*) that occurs in the Gulf of Mexico is listed as threatened, although other DPSs are endangered.

Critical habitat has been designated for the loggerhead turtle in the Gulf of Mexico as shown in **Figure 3**. Loggerhead turtles in the Gulf of Mexico are part of the Northwest Atlantic Ocean DPS (76 FR 58868). In July 2014, NMFS and the USFWS designated critical habitat for this DPS (NMFS, 2014b). The USFWS designation (79 FR 39756) includes nesting beaches in Jackson County, Mississippi; Baldwin County, Alabama; and Bay, Gulf, and Franklin Counties in the Florida Panhandle as well as several counties in southwest Florida and the Florida Keys (and other areas along the Atlantic coast). The NMFS designation (79 FR 39856) includes nearshore reproductive habitat within 1 mile (1.6 km) seaward of the mean high water line along these same nesting beaches. NMFS also designated a large area of shelf and oceanic waters, termed *Sargassum* habitat, in the Gulf of Mexico (and Atlantic Ocean) as critical habitat. *Sargassum* is a brown alga (Class Phaeophyceae) that takes on a planktonic, often pelagic existence after being removed from reefs during rough weather. Rafts of *Sargassum* serve as important foraging and developmental habitat for numerous fishes, and young sea turtles, including loggerhead turtles. NMFS designated three other categories of critical habitat as well; of these, two (migratory habitat and overwintering habitat) are along the Atlantic coast and the third (breeding habitat) is found in the Florida Keys and along the Florida east coast (NMFS, 2014b).

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 120 statute miles (193 km) north of the project area. The project area is located approximately 7 statute miles (11 km) from the designated *Sargassum* critical habitat for loggerhead sea turtles (**Figure 3**).

Leatherback and loggerhead turtles are the most likely species to be present near the project area as adults. Green, hawksbill, and Kemp's ridley turtles are typically inner shelf and nearshore species, unlikely to occur near the project area as adults. Hatchlings or juveniles of any of the sea turtle species may be present in deepwater areas, including the project area, where they may be associated with floating mats of *Sargassum* and other flotsam.

All five sea turtle species in the Gulf of Mexico are migratory and use different marine habitats according to their life stage. These habitats include high-energy beaches for nesting females and emerging hatchlings and pelagic convergence zones for hatchling and juvenile turtles. As adults, green, hawksbill, and loggerhead turtles forage primarily in shallow, benthic habitats. Leatherback turtles are the most pelagic of the sea turtles, feeding primarily on jellyfish.

Sea turtle nesting in the northern Gulf of Mexico can be summarized by species as follows:

- Loggerhead turtles – Loggerhead turtles nest in significant numbers along the Florida Panhandle (Florida Fish and Wildlife Conservation Commission, 2018a) and, to a lesser extent, from Texas through Alabama (NMFS and USFWS, 2008).
- Green and leatherback turtles – Green and leatherback turtles infrequently nest on Florida Panhandle beaches (Florida Fish and Wildlife Conservation Commission, 2018b, c).

- Kemp's ridley turtles – The critically endangered Kemp's ridley turtle nests almost exclusively on a 16-mile (26-km) stretch of coastline near Rancho Nuevo in the Mexican state of Tamaulipas (NMFS, 2011). A much smaller but growing population nests in Padre Island National Seashore, Texas, mostly as a result of reintroduction efforts (NMFS, 2011). A total of 353 Kemp's ridley turtle nests were counted on Texas beaches in 2017, an increase from the 185 counted in 2016, 159 counted in 2015, and 118 counted in 2014 (Turtle Island Restoration Network, 2017). Padre Island National Seashore along the coast of Willacy, Kenedy, and Kleberg Counties in southern Texas, is the most important nesting location for this species in the United States, although there have been occasional reports of Kemp's ridleys nesting in Alabama (Share the Beach, 2016).

- Hawksbill turtles – Hawksbill turtles typically do not nest anywhere near the project area, with most nesting in the region located in the Caribbean Sea and on the beaches of the Yucatán Peninsula (U.S. Fish and Wildlife Service, 2016a).

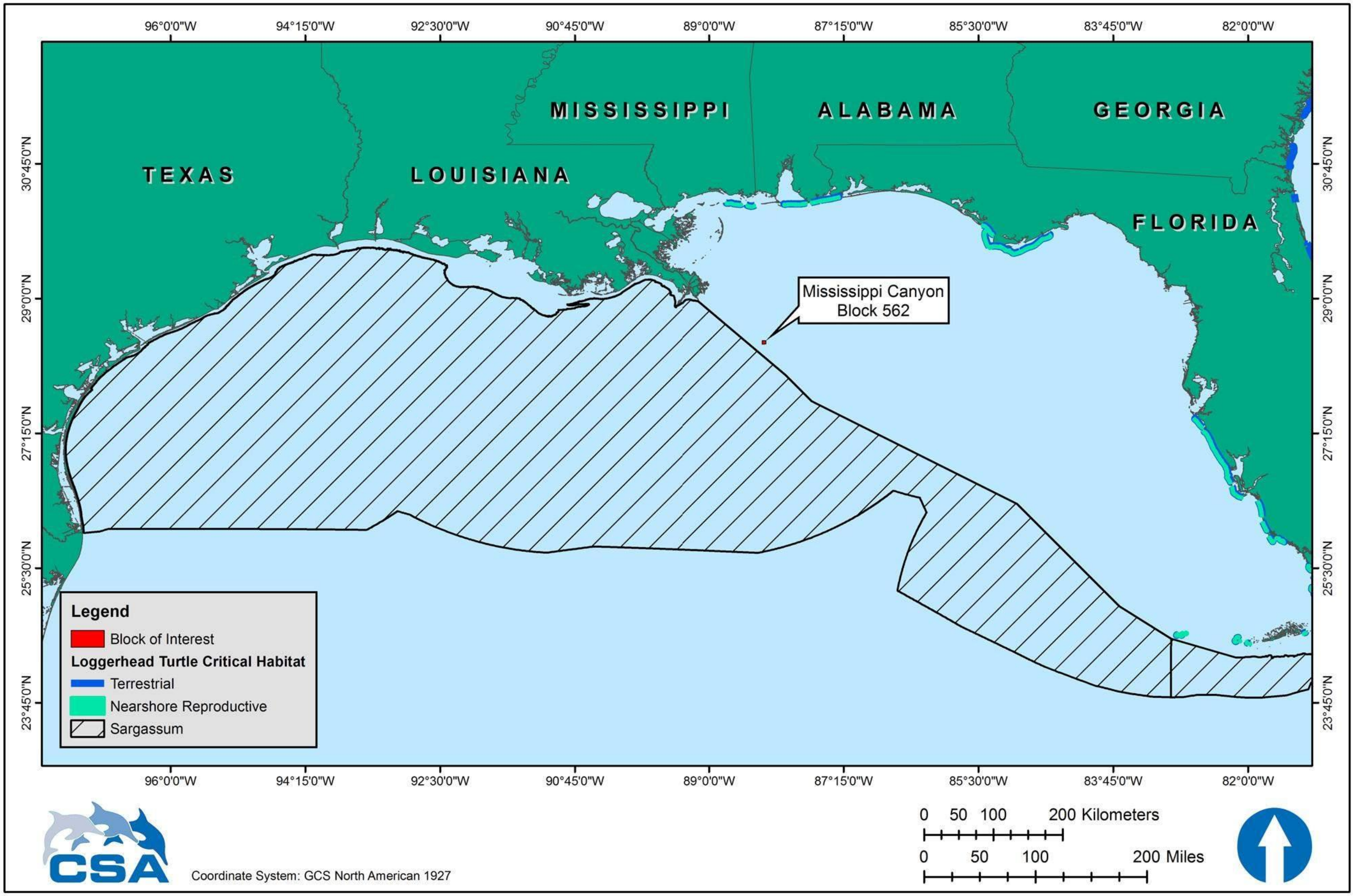


Figure 3. Location of loggerhead turtle designated critical habitat in relation to the project area in Mississippi Canyon Block 562.

## Impacts of MODU Presence, Noise, and Lights

Offshore drilling activities produce a broad array of sounds at frequencies and intensities that may be detected by sea turtles (Samuel et al., 2005, Popper et al., 2014). Sea turtles hear low frequency sounds, mainly below 1,200 Hz (Bartol and Ketten, 2006, Bartol, 2014). Potential impacts may include behavioral disruption and temporary or permanent displacement from the area near the sound source. The currently accepted response estimates are derived from fish hearing data rather than from marine mammal hearing data due to the limited experimental data available (Popper et al., 2014). A NMFS Biological Opinion (NMFS, 2015a) lists sea turtle underwater acoustic injury and behavioral thresholds at 207 dB re 1 µPa and 166 dB re 1 µPa, respectively[3]. No distinction is made between impulsive and continuous sources for these thresholds. Based on transmission loss calculations (see Urick, 1983), open water propagation of noise produced by typical sources with DP thrusters are not expected to produce received levels greater than 160 dB re 1 µPa beyond 82 ft (25 m) from the source. Certain sea turtles, especially loggerheads, may be attracted to offshore structures (Lohoefener et al., 1990, Gitschlag et al., 1997) and, thus, may be more susceptible to impacts from sounds produced during routine operations. The most likely impacts would be short-term behavioral changes such as diving and evasive swimming, disruption of activities, or departure from the area. Due to the small impact area around the wellsite, limited number of sources, and short duration of activities, these short-term impacts are not expected to be biologically significant to sea turtle populations.

Artificial lighting can disrupt the nocturnal orientation of sea turtle hatchlings (Witherington, 1997, Tuxbury and Salmon, 2005). However, hatchlings may rely less on light cues when they are offshore than when they are emerging on the beach (Salmon and Wyneken, 1990). NMFS (2007) concluded that the effects of lighting from offshore structures on sea turtles are insignificant.

## Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb sea turtles, and there is also a risk of vessel strikes. Data show that vessel traffic is one cause of sea turtle mortality in the Gulf of Mexico (Lutcavage et al., 1997). While adult sea turtles are visible at the surface during the day and in clear weather, they can be difficult to spot from a moving vessel when resting below the water surface, during nighttime, or during periods of inclement weather. To reduce the potential for vessel strikes, BOEM issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for sea turtles and slow down or stop their vessel to avoid striking protected species, and requires operators to report sightings of any injured or dead protected species. When sea turtles are sighted, vessel operators and crews are required to attempt to maintain a distance of 45 m (150 ft) or greater whenever possible. Compliance with this NTL is expected to minimize the likelihood of vessel strikes during periods of daylight and during sea and weather conditions that permit sighting of turtles on the sea surface (NMFS, 2007).

Noise generated from support helicopter traffic also has the potential to disturb sea turtles. However, while flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. This altitude will minimize the potential for disturbing sea turtles, and no significant impacts are expected (NMFS, 2007, BOEM, 2012a).

[3] There are no established Temporary Threshold Shift (TTS) or Permanent Threshold Shift (PTS) criteria for sea turtles.

## Impacts of a Small Fuel Spill

Potential spill impacts on sea turtles are discussed by NMFS (2007) and BOEM (2017a, b). For this EP, there are no unique site-specific issues with respect to spill impacts on sea turtles.

The probability of a fuel spill is expected to be minimized by BP's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of BP's OSRP is expected to minimize potential impacts on sea turtles. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and noise of response vessels and aircrafts (NMFS, 2014a). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. Therefore, due to the limited areal extent and short duration of water quality impacts from a small fuel spill, no significant impacts to sea turtles from direct or indirect exposure would be expected.

<u>Loggerhead Critical Habitat – Nesting Beaches</u>. A small fuel spill in the project area would be unlikely to affect sea turtle nesting beaches due to the distance from the nearest shoreline. Loggerhead turtle nesting beaches and nearshore reproductive habitat designated as critical habitat are located in Mississippi, Alabama, and the Florida Panhandle, at least 120 statute miles (192 km) from the project area. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to natural dispersion.

<u>Loggerhead Critical Habitat – *Sargassum*.</u> The project area is approximately 7 statute miles (11 km) from the designated *Sargassum* critical habitat for the loggerhead turtles (**Figure 3**). A small diesel fuel spill could affect *Sargassum* and juvenile turtles by contaminating this habitat. Juvenile sea turtles could come into contact with or ingest oil, resulting in death, injury, or other sublethal effects. Effects of a small spill on *Sargassum* critical habitat for loggerhead turtles would be limited to the small area (0.5 to 5 ha [1.2 to 12 ac]) likely to be impacted by a small spill. An impact area of 5 ha (12 ac) would represent a negligible portion of the approximately 40,662,810 ha (100,480,000 ac) designated *Sargassum* critical habitat for loggerhead turtles in the northern Gulf of Mexico.

## Impacts of a Large Oil Spill

Impacts of oil spills on sea turtles can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, and dispersants). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes and smoke (e.g., from *in situ* burning of oil); ingestion of oil (and dispersants) directly or via contaminated food; and stress from the activities and marine sound of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing food availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (NOAA, 2010, NMFS, 2014a). In the unlikely event of a spill, implementation of BP's OSRP is expected to minimize the potential for these types of impacts on sea turtles. EP Appendix G provides further details on spill response measures.

Studies of oil effects on loggerhead turtles in a controlled setting (NOAA, 2010, Lutcavage et al., 1995) suggest that sea turtles show no avoidance behavior when they encounter an oil slick, and any sea turtle in an affected area would be expected to be exposed. Sea turtles' diving behaviors also put them at risk because they rapidly inhale a large volume of air before diving and continually resurface over time, which may result in repeated exposure to volatile vapors and oiling (NMFS, 2007).

Loggerhead Critical Habitat – Nesting Beaches. If spilled oil reaches sea turtle nesting beaches, nesting sea turtles and egg development could be affected (NMFS, 2007). An oiled beach could affect nest site selection or result in no nesting at all (e.g., false crawls). Upon hatching and successfully reaching the water, hatchlings are subject to the same types of oil spill exposure hazards as adults. Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects, from acute toxicity to impaired movement and normal bodily functions (NMFS, 2007).

The 30-day OSRA results summarized in **Table 4** estimate that Louisiana and Florida shorelines that may support limited sea turtle nesting could be contacted within 30 days (1 to 11% conditional probability). Plaquemines Parish in Louisiana is the coastal area most likely to be affected (5% probability within 10 days; and 11% probability within 30 days). The 60-day OSRA modeling (**Table 5**) predicts the conditional probability of contacting Mississippi, Alabama, and Florida Panhandle shorelines that support significant loggerhead sea turtle nesting is 24% or less. The nearest nearshore reproductive critical habitat for the loggerhead turtle in Baldwin County, Alabama is 120 miles (193 km) from the project area and is predicted by the 60-day OSRA model to have an 18% or less conditional probability of contact within 60 days of a spill.

Loggerhead Critical Habitat – *Sargassum*. The project area is approximately 7 statute miles (11 km) from the loggerhead turtle critical habitat designated as *Sargassum* habitat, which includes most of the Western and Central Planning Areas in the Gulf of Mexico and parts of the southern portion of the Eastern Planning Area (**Figure 3**) (NMFS, 2014b). Because of the large area covered by the designated *Sargassum* habitat for loggerhead turtles, a large spill could result in a substantial part of the *Sargassum* habitat in the northern Gulf of Mexico being oiled. However, the 2010 Macondo spill affected approximately one-third of the *Sargassum* habitat in the northern Gulf of Mexico (BOEM, 2014). It is extremely unlikely that the entire *Sargassum* critical habitat would be affected by a large spill.

The effects of oiling on *Sargassum* vary with spill severity, but moderate to heavy oiling that could occur during a large spill could cause complete mortality to *Sargassum* and its associated communities (BOEM, 2017a). *Sargassum* has the potential to sink during a large spill, thus temporarily removing the habitat and possibly being an additional pathway of exposure to the benthic environment (Powers et al., 2013). Lower levels of oiling may cause sub-lethal affects, including a reductrion in growth, productivity, and recruitment of organisms associated with

*Sargassum*. The *Sargassum* algae itself could be less impacted by light to moderate oiling than associated organisms because of a waxy outer layer that might help protect it from oiling (BOEM, 2016b) *Sargassum* has a yearly seasonal cycle of growth and a yearly cycle of migration from the Gulf of Mexico to the western Atlantic. A large spill could affect a large portion of the annual crop of the algae; however, because of its ubiquitous distribution and seasonal cycle, recovery of the *Sargassum* community would be expected to occur within a short time (BOEM, 2017a).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sea turtles and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels would operate in accordance with NTL BOEM-2016-G01 to reduce the potential for striking or disturbing sea turtles.

### C.3.5 Piping Plover (Threatened)

The Piping Plover (*Charadrius melodus*) is a migratory shorebird that overwinters along the southeastern U.S. and Gulf of Mexico coasts. This threatened species is in decline as a result of hunting, habitat loss and modification, predation, and disease (U.S. Fish and Wildlife Service, 2003). Critical overwintering habitat has been designated, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida (**Figure 4**). Piping Plovers inhabit coastal sandy beaches and mudflats, feeding by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening (U.S. Fish and Wildlife Service, nd).

A large oil spill is the only IPF that potentially may affect Piping Plovers. There are no IPFs associated with routine project activities that could affect these birds. A small fuel spill in the project area would be unlikely to affect Piping Plovers because a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up (see explanation in **Section A.9.1**). Noise from helicopters would be unlikely to significantly affect piping plover populations, because it is assumed that helicopters will maintain an altitude of 305 m (1,000 ft) over unpopulated areas or across coastlines.

#### Impacts of a Large Oil Spill

The project area is approximately 63 statute miles (101 km) from the nearest shorelines designated as critical habitat for the Piping Plover (**Figure 4**). The 30-day OSRA modeling (**Table 4**) predicts that Piping Plover critical habitat in Plaquemines Parish, Louisiana could be contacted within 10 days of a spill (5% conditional probability). The 60-day OSRA modeling (**Table 5**) predicts that during the fall, there is a 24% conditional probability that an oil spill from the project area would reach a shoreline designated as critical habitat for the Piping Plover within 60 days of a spill. Plovers could physically oil themselves while foraging on oiled shores or secondarily contaminate themselves through ingestion of oiled intertidal sediments and prey (BOEM, 2017a, b). Piping Plovers congregate and feed along tidally-exposed banks and shorelines, following the tidal boundary and foraging at the water's edge. It is possible that some deaths of Piping Plovers could occur, especially if spills occur during winter months when plovers are most common along the coastal Gulf or if spills contacted critical habitat. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. BP has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

### C.3.6 Whooping Crane (Endangered)

The Whooping Crane (*Grus americana*) is a large omnivorous wading bird listed as an endangered species. Three wild populations live in North America (National Wildlife Federation, 2016). One population winters along the Texas coast at Aransas NWR and summers at Wood Buffalo National Park in Canada. This population represents the majority of the world's population of free-ranging Whooping Cranes, reaching a record estimated population of 431 during the 2016 to 2017 winter (U.S. Fish and Wildlife Service, 2017). A non-migrating population was reintroduced in central Florida, and another reintroduced population summers in Wisconsin and migrates to the southeastern U.S. for the winter. Whooping Cranes breed, migrate, winter, and forage in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields (U.S. Fish and Wildlife Service, 2007). About 9,000 ha (22,240 ac) of salt flats on Aransas NWR and adjacent islands comprise the principal wintering grounds of the Whooping Crane. Aransas NWR is designated as critical habitat for the species.

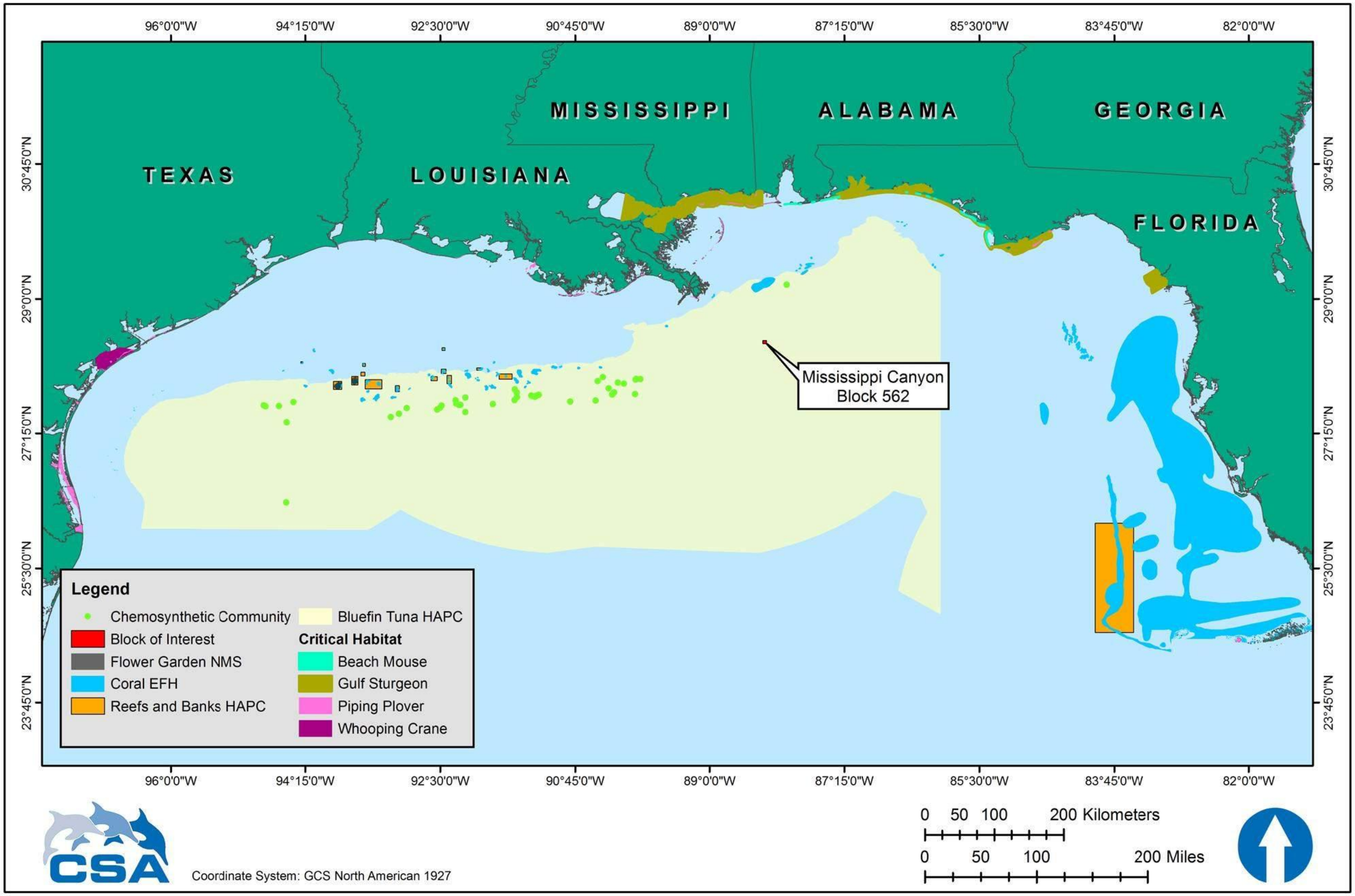


Figure 4. Location of selected environmental features in relation to the project area in Mississippi Canyon Block 562.

A large oil spill is the only IPF that potentially may affect Whooping Cranes. A small fuel spill in the project area would also be unlikely to affect Whooping Cranes, due to the distance from Aransas NWR. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior natural dispersion.

### Impacts of a Large Oil Spill (WCD)

A large oil spill is unlikely to affect Whooping Cranes as the project area is approximately 496 statute miles (798 km) from the Aransas NWR, which is the nearest designated critical habitat. The 30-day OSRA modeling (**Table 4**) predicts a <0.5% or less chance of oil contacting Whooping Crane critical habitat within 30 days of a spill. The 60-day OSRA model (**Table 5**) predicts that there is a <0.5% or less chance oil contacting Whooping Crane critical habitat within 60 days of a spill.

In the event of oil exposure, Whooping Cranes could physically oil themselves while foraging in oiled areas or secondarily contaminate themselves through ingestion of contaminated prey items. It is possible that some Whooping Crane deaths could occur, especially if a spill occurred during winter months when Whooping Cranes are most common along the Texas coast and if the spill contacts their critical habitat in Aransas NWR. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. In the event of a spill, BP would work with the applicable state and federal agencies to prevent impacts on Whooping Cranes. BP has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

## C.3.7 Oceanic Whitetip Shark (Threatened)

The oceanic whitetip shark (*Carcharhinus longimanus*) was listed as threatened under the ESA on 30 January 2018 (effective 30 March 2018) by NMFS (83 FR 4153). Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude, and have generally been described as one of the most abundant species of oceanic sharks (Compagno, 1984). However, the population trend appears to be decreasing as the species is now only occasionally reported in the Gulf of Mexico (Baum et al., 2015).

A comparison of historical shark catch rates in the Gulf of Mexico by Baum and Myers (2004) noted that most recent papers described the oceanic whitetip shark as rare or absent in the Gulf of Mexico. NMFS (2018) noted that there has been an 88% decline in abundance of the species in the Gulf of Mexico since the mid-1990s due to commercial fishing pressure.

IPFs that could affect the oceanic whitetip shark include MODU presence, noise, and lights, and a large oil spill. Impacts from effluent discharges are not expected due to rapid dilution of effluents and adherence to NPDES permit limits and requirements. A small diesel fuel spill in the project area would be unlikely to affect oceanic whitetip sharks due to rapid natural dispersion of diesel fuel and the low density of oceanic whitetip sharks potentially present in GC 563.

### Impacts of MODU Presence, Noise, and Lights

Offshore drilling activities produce a broad array of sounds at frequencies and intensities that may be detected by sharks including the threatened oceanic whiteip shark. Shark hearing abilities have the highest sensitivity to low frequency sounds between approximately 40 and 800 Hz (Myrberg Jr., 2000). Sharks are most attracted to sounds in broadband frequencies below 80 Hz (Myrberg Jr., 2000), a frequency that overlaps with sound pressure levels associated with drilling activities (typically 10 Hz to 10 kHz) (Hildebrand, 2005). MODU noise could also influence prey behaviors such as predator avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010, Bruintjes and Radford, 2013, McLaughlin and Kunc, 2015, Nedelec et al., 2017). However, because of the limited propagation distances of high sound pressure levels from the MODU, impacts would be limited in geographic scope and no population level impacts on oceanic whitetip sharks are expected.

#### Impacts of a Large Oil Spill

Information regarding the direct effects of oil on elasmobranchs, including the oceanic whitetip shark are largely unknown. However, in the event of a large oil spill, oceanic whitetip sharks could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Because oceanic whitetip sharks may be found in surface waters, they could be more likely to be impacted by floating oil than other species which only reside at depth.

It is possible that a large oil spill could affect individual oceanic whitetip sharks and result in injuries or deaths. However, due to the low density of oceanic whitetip sharks thought to exist in the Gulf of Mexico, it is unlikely that a large spill would result in population level effects.

### C.3.8 Gulf Sturgeon (Threatened)

The Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is a threatened fish species that inhabits major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida (Barkuloo, 1988, Wakeford, 2001). Sturgeon are anadromous fish that migrate from the sea upstream into coastal rivers to spawn in freshwater.

The historic range of the species extended from the Mississippi River to Charlotte Harbor, Florida (Wakeford, 2001). This range has contracted to encompass major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida. Populations have been depleted or even extirpated throughout this range by fishing, shoreline development, dam construction, water quality changes, and other factors (Barkuloo, 1988, Wakeford, 2001). These declines prompted the listing of the Gulf sturgeon as a threatened species in 1991. The best-known populations occur in the Apalachicola and Suwannee Rivers in Florida (Carr, 1996, Sulak and Clugston, 1998), the Choctawhatchee River in Alabama (Fox et al., 2000), and the Pearl River in Mississippi/Louisiana (Morrow et al., 1998). Rudd et al. (2014) reconfirmed the spatial distribution and movement patterns of Gulf Sturgeon by surgically implanting acoustic telemetry tags. Critical habitat in the Gulf extends from Lake Borgne, Louisiana (St. Bernard Parish), to Suwannee Sound, Florida (Levy County) (NMFS, 2014c) (**Figure 4**). A species description is presented by BOEM (2012a) and in the recovery plan for this species (USFWS et al., 1995).

A large oil spill is the only IPF that potentially may affect Gulf sturgeon. There are no IPFs associated with routine project activities that could affect these fish. A small fuel spill in the project area would be unlikely to affect Gulf sturgeon because a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up (see explanation in **Section A.9.1**).

### Impacts of a Large Oil Spill

Potential spill impacts on Gulf sturgeon are discussed by NMFS (2007) and BOEM (2012a, 2017a, b). For this EP, there are no unique site-specific issues with respect to this species.

The project area is approximately 119 statute miles (192 km) from the nearest Gulf sturgeon critical habitat. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has 2% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 30 days of a spill. The 60-day OSRA modeling (**Table 5**) predicts that a spill in the project area has a 19% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 60 days of a spill.

In the event of oil reaching Gulf sturgeon habitat, the fish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Based on the life history of this species, sub-adult and adult Gulf sturgeon would be most vulnerable to an estuarine or marine oil spill, and would be vulnerable only from 1 September through 30 April when this species is foraging in estuarine and shallow marine habitats (NMFS, 2007).

## C.3.9 Beach Mice (Endangered)

Four subspecies of endangered beach mouse (*Peromyscus polionotus*) occur on the barrier islands of Alabama and the Florida Panhandle. They are the Alabama, Choctawhatchee, Perdido Key, and St. Andrew beach mice. Critical habitat has been designated for all four subspecies; combined critical habitat for the subspecies is shown in **Figure 4**. Species descriptions are provided by BOEM (2012a).

A large oil spill is the only IPF that potentially may affect beach mice. There are no IPFs associated with routine project activities that could affect these animals due to the distance from shore and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect beach mice because a small fuel spill would not be expected to reach beach mice habitat prior to dispersion and weathering (see **Section A.9.1**).

### Impacts of a Large Oil Spill

Potential spill impacts on beach mice are discussed by BOEM (2017a, b). For this EP, there are no unique site-specific issues with respect to these species that were not analyzed in these documents.

Beach mouse critical habitat in Baldwin County, Alabama, is approximately 123 statute miles (198 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% or less conditional probability of contacting any coastal areas containing beach mouse critical habitat within 30 days of a spill. The 60-day OSRA modeling (**Table 5**) predicts that a spill in the project areas has an 18% or less conditional probability of contacting any coastal areas containing beach mouse critical habitat within 60 days of a spill.

In the event of oil contacting these beaches, beach mice could experience several types of direct and indirect impacts. Contact with spilled oil could cause skin and eye irritation and subsequent infection; matting of fur; irritation of sweat glands, ear tissues, and throat tissues; disruption of sight and hearing; asphyxiation from inhalation of fumes; and toxicity from ingestion of oil and contaminated food. Indirect impacts could include reduction of food supply, destruction of habitat, and fouling of nests. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. However, any such impacts are unlikely due to the distance from shore and response actions that would occur in the event of a spill.

### C.3.10 Threatened Coral Species

Four threatened coral species are known from the northern Gulf of Mexico: elkhorn coral (*Acropora palmata*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), and boulder star coral (*Orbicella franksi*). These species have been reported from the Flower Garden Banks (NOAA, 2017c), but are unlikely to be present as regular residents anywhere else in the northern Gulf of Mexico because they typically inhabit coral reefs in shallow, clear tropical or subtropical waters. Other Caribbean coral species evaluated by NMFS in 2014 (79 FR 53852) either do not meet the criteria for ESA listing or are not known from the Flower Garden Banks. Critical habitat has been designated for elkhorn corals in the Florida Keys, but none has been designated for the other threatened coral species included here. A species description of elkhorn coral is presented in the recovery plan for the species (NMFS, 2015b).

There are no IPFs associated with routine project activities that could affect threatened corals in the northern Gulf of Mexico. A small fuel spill would not affect threatened coral species because the oil would float and dissipate on the sea surface. A large oil spill is the only relevant IPF.

#### Impacts of a Large Oil Spill

Based on the 60-day OSRA modeling results (**Table 5**), a large oil spill would be unlikely (<0.5% probability) to reach elkhorn coral critical habitat in the Florida Keys (Monroe County, Florida). A spill would be unlikely to contact the corals of the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 337 statute miles [542 km]), and the difference in water depth between the project area (1,962 m [6,436 ft]) and the Banks (approximately 17 to 145 m [56 to 476 ft]). While on the surface, oil would not be expected to contact corals growing on the seafloor, but could feasibly impact planktonic larvae. Natural or chemical dispersion of oil could cause a subsurface plume which would have the possibility of contacting seafloor corals.

If a subsurface plume were to occur, impacts on the Flower Garden Banks would be unlikely due to the distance between the project area and corals within the Flower Garden Banks (approximately 337 statute miles [542 km]), and the shallow location of the coral cap of the Banks. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf edge. Valentine et al. (2014) observed the spatial distribution of excess hopane, a crude oil tracer from Macondo spill sediment core samples, to be in the deeper waters and not transported up the shelf, thus confirming that near-bottom currents flow along the isobaths.

In the unlikely event that an oil slick reached reefs at the Flower Garden Banks or other Gulf of Mexico reefs, oil droplets or oiled sediment particles could come into contact with reef organisms or corals. As discussed by BOEM (2017a, b), impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; change in sediment characteristics; and reduction or loss of one or more commercial and recreational fishery habitats. Sub-lethal effects could be long-lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature and diseases) (BOEM, 2017a).

Due to the distance between the project area and coral habitats, there is a low chance of oil contacting threatened coral habitat in the event of a spill, and no significant impacts on threatened coral species are expected.

## C.4 Coastal and Marine Birds

### C.4.1 Marine Birds

Marine birds include seabirds and other species that may occur in the pelagic environment of the project area (Clapp et al., 1982a, Clapp et al., 1982b, 1983, Peake, 1996, Hess and Ribic, 2000). Seabirds spend much of their lives offshore over the open ocean, except during breeding season when they nest along the coast (on the mainland and on barrier islands). In addition, other birds such as waterfowl, marsh birds, and shorebirds may occasionally be present over open ocean areas. No endangered or threatened bird species are likely to occur at the project area due to the distance from shore. For a discussion of shorebirds and coastal nesting birds, see **Section C.4.2**.

Seabirds of the northern Gulf of Mexico were surveyed from ships during the GulfCet II program (Davis et al., 2000b). Hess and Ribic (2000) reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in the deepwater area. From these surveys, four ecological categories of seabirds were documented in the deepwater areas of the Gulf: summer migrants (shearwaters, storm petrels, boobies); summer residents that breed in the Gulf (Sooty Tern, Least Tern, Sandwich Tern, Magnificent Frigatebird); winter residents (gannets, gulls, jaegers); and permanent resident species (Laughing Gulls, Royal Terns, Bridled Terns) (Hess and Ribic, 2000).

Common seabird species include Wilson's Storm-Petrel (*Oceanites oceanicus*), Magnificent Frigatebird (*Fregata magnificens*), Northern Gannet (*Morus bassanus*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Cory's Shearwater (*Calonectris diomedea*), Greater Shearwater (*Puffinus gravis*), and Audubon's Shearwater (*Puffinus lherminieri*). Seabirds are distributed Gulf-wide and are not specifically associated with the project area.

Relationships with hydrographic features were found for several seabird species, possibly due to effects of hydrography on nutrient levels and productivity of surface waters where birds forage. The GulfCet II study did not estimate bird densities; however, Powers (1987) indicates that seabird densities over the open ocean typically are <10 birds $km^{-2}$.

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may be present in the project area. Migrant birds may use offshore structures, including platforms and semisubmersibles for resting, feeding, or as temporary shelter from inclement weather (Russell, 2005). Some birds may be attracted to offshore structures because of the lights and the fish populations that aggregate around these structures.

IPFs that potentially may affect marine birds include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents – a small fuel spill and a large oil spill. Effluent discharges permitted under the NPDES are likely to have negligible impacts on the birds due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these animals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on birds. The IPFs with potential impacts listed in **Table 2** are discussed below.

### Impacts of Drilling Rig Presence, Underwater Sound, and Lights

Birds that frequent offshore drilling operations may be exposed to contaminants including air pollutants and routine discharges, but significant impacts are unlikely due to rapid dispersion. Birds migrating over water have been known to strike offshore structures, resulting in injury and/or death (Wiese et al., 2001, Russell, 2005). Mortality of migrant birds at tall towers and other land-based structures has been reviewed extensively, and the mechanisms involved in rig collisions appear to be similar. In some cases, migrants simply do not see a part of the rig until it is too late to avoid it. In other cases, navigation may be disrupted by marine sound (Russell, 2005). On the other hand, offshore structures are suitable stopover perches for most trans-Gulf migrant species, and most of the migrants that stop over on rigs probably benefit from their stay, particularly in spring (Russell, 2005). Due to the limited scope and short duration of drilling activities described in this EP, any impacts on populations of either seabirds or trans-Gulf migrant birds are not expected to be significant.

### Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb marine birds in open, offshore waters. It is likely that individual birds would experience, at most, only short-term behavioral disruption, and the impact would not be significant.

### Impacts of a Small Fuel Spill

Potential spill impacts on marine birds are discussed by BOEM (2017a, b). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill is expected to be minimized by BP's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of BP's OSRP is expected to reduce the potential for impacts on marine and pelagic birds. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area and the expected short duration of a small fuel spill, the potential exposure period for pelagic marine birds would be brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Birds exposed to oil on the sea surface could experience direct physical and physiological effects including skin irritation; chemical burns of skin, eyes, and mucous membranes; and inhalation of VOCs. Due to the limited areal extent and short duration of water quality impacts from a small fuel spill, secondary impacts due to ingestion of oil via contaminated prey or reductions in prey abundance are unlikely. Due to the low densities of birds in open ocean areas, the small area affected, and the brief duration of the surface slick, no significant impacts on pelagic birds would be expected.

### Impacts of a Large Oil Spill

Potential spill impacts on marine and pelagic birds are discussed by BOEM (2017a, b). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

Pelagic seabirds could be exposed to oil from a spill at the project area. Hess and Ribic (2000) reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in the deepwater Gulf of Mexico (>200 m). Powers (1987) indicates that seabird densities over the open ocean typically are <10 birds $km^{-2}$. The number of pelagic birds that could be affected in open, offshore waters would depend on the extent and persistence of the oil slick.

Data following the *Deepwater Horizon* incident provide relevant information about the species of marine birds that may be affected in the event of a large oil spill. Birds that were treated for oiling include several marine species such as the Northern Gannet, Magnificent Frigatebird, and Masked Booby (U.S. Fish and Wildlife Service, 2011). The Northern Gannet is among the species with the largest numbers of birds affected by the spill. Exposure of marine birds to oil can result in adverse health with severity, depending on the level of oiling. Effects can range from plumage damage and loss of buoyancy from external oiling to more severe effects, such as organ damage, immune suppression, endocrine imbalance, reduced aerobic capacity, and death as a result of oil inhalation or ingestion (NOAA, 2016b).

## C.4.2 Coastal Birds

Threatened and endangered bird species (Piping Plover and Whooping Crane) were discussed previously in **Sections C.3.5** and **C.3.6**. Various species of non-endangered birds are found along the northern Gulf Coast, including diving birds, shorebirds, marsh birds, wading birds, and waterfowl. Gulf Coast marshes and beaches provide important feeding and nesting habitats. Species that nest on beaches, flats, dunes, bars, barrier islands, and similar coastal and nearshore habitats include the Sandwich Tern, Wilson's Plover, Black Skimmer, Forster's Tern, Gull-Billed Tern, Laughing Gull, Least Tern, and Royal Tern (U.S. Fish and Wildlife Service, 2010).

The Eastern Brown Pelican (*Pelecanus occidentalis*) was delisted from federal endangered status in 2009 (U.S. Fish and Wildlife Service, 2016b). However, this species remains listed as endangered by both Louisiana (State of Louisiana Department of Wildlife and Fisheries, nd) and Mississippi (Mississippi Natural Heritage Program, 2015). The Brown Pelican was delisted as a species of special concern by the State of Florida in 2017 (Florida Fish and Wildlife Conservation Commission, 2017). Brown Pelicans inhabit coastal habitats and forage within both coastal waters and waters of the inner continental shelf. Aerial and shipboard surveys, including GulfCet and GulfCet II, indicate that Brown Pelicans do not occur in deep offshore waters (Fritts and Reynolds, 1981, Peake, 1996, Hess and Ribic, 2000). Nearly half the southeastern population of Brown Pelicans lives in the northern Gulf Coast, generally nesting on protected islands (U.S. Fish and Wildlife Service, 2010).

The Southern Bald Eagle (*Haliaeetus leucocephalus*) was delisted from its threatened status in the lower 48 states on 28 June 2007, but still receives protection under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act of 1940. The Bald Eagle is a terrestrial raptor widely distributed across the southern U.S., including coastal habitats along the Gulf of Mexico. The Gulf Coast is inhabited by both wintering migrant and resident Bald Eagles (Johnsgard, 1990, Ehrlich et al., 1992).

IPFs that potentially may affect shorebirds and coastal nesting birds include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect shorebirds or coastal nesting birds, as the project area is 64 statute miles (103 km) from the nearest shoreline. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dispersion and weathering. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on shorebirds.

### Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters will transit coastal areas near Port Fourchon and Houma, Louisiana, where shorebirds and coastal nesting birds may be found. These activities could periodically disturb individuals or groups of birds within coastal habitats (e.g., wetlands that may support feeding, resting, or breeding birds).

Vessel traffic may disturb some foraging and resting birds. Flushing distances vary among species and among individuals (Rodgers and Schwikert, 2002). The disturbances will be limited to flushing birds away from vessel pathways; known distances are from 20 to 49 m (65 to 160 ft) for personal watercrafts and 23 to 58 m (75 to 190 ft) for outboard-powered boats (Rodgers and Schwikert, 2002). Support vessels will not approach nesting or breeding areas on the shoreline, so disturbances to nesting birds, eggs, and chicks is not expected. Vessel operators are expected to use designated navigation channels and comply with posted speed and wake restrictions while transiting sensitive inland waterways. Due to the limited scope and short duration of drilling activities, any short-term impacts are not expected to be significant to coastal bird populations.

Aircraft traffic can cause some disturbance to birds onshore and offshore. Responses are highly dependent on the type of aircraft, the bird species, the activities that the animals were previously engaged in, and previous exposures to overflights (Efromyson et al., 2003). Helicopters seem to cause the most intense responses over other human disturbances (Bélanger and Bédard, 1989). The Federal Aviation Administration recommends (Advisory Circular No. 91-36D) that pilots maintain a minimum altitude of 610 m (2,000 ft) when flying over marine sound-sensitive areas such as parks, forest, primitive areas, wilderness areas, National Seashores, or National Wildlife Refuges, and maintain flight paths to reduce aircraft marine sound in these marine sound-sensitive areas. The 2,000-ft altitude minimum is greater than the distance (slant range) at which aircraft overflights have been reported to cause behavioral effects on most species of birds studied by Efroymson et al. (2000). With adherence to the Federal Aviation Administration guidelines, it is likely that individual birds would experience, at worst, only short-term behavioral disruption from aircraft traffic.

### Impacts of Large Oil Spill

The 30-day OSRA results summarized in **Table 4** estimate that shorelines Plaquemines Parish could be contacted within 10 days (5% conditional probability), Lafourche and Plaquemines Parishes in Louisiana could be contacted within 10 days (1 to 5% conditional probabilities) and other Louisiana and Florida shorelines could be affected within 30 days (1 to 11% conditional probability). The 60-day OSRA modeling (**Table 5**) predicts that shorelines between Matagorda County, Texas, and Levy County, Florida, have up to a 24% probability of contact within 60 days of a spill.

Coastal birds can be exposed to oil as they float on the water surface, dive during foraging, or wade in oiled coastal waters. Oiled birds can lose the ability to fly, dive for food, or float on the water, which could lead to drowning (U.S. Fish and Wildlife Service, 2010). Oil interferes with the water repellency of feathers and can cause hypothermia under certain conditions. As birds groom themselves, they can ingest and inhale the oil on their bodies. Scavengers such as Bald Eagles and gulls can be exposed to oil by feeding on carcasses of contaminated fish and wildlife. While ingestion can kill animals immediately, more often it results in lung, liver, and kidney damage, which can lead to death (BOEM, 2017a). Bird eggs may be damaged if an oiled adult sits on the nest.

Brown and White Pelicans are especially at risk from direct and indirect impacts from spilled oil within inner shelf and inshore waters, such as embayments. The range of this species is generally limited to these waters and surrounding coastal habitats. Brown and White Pelicans feed on mid-sized fish that they capture by diving from above ("plunge diving") and then scoop the fish into their expandable gular pouch. This behavior makes them susceptible to plumage oiling if they feed in areas with surface oil or an oil sheen. They may also capture prey that has been physically contaminated with oil or has ingested oil. Issues for Brown and White Pelicans include direct contact with oil, disturbance by cleanup activities, and long-term habitat contamination (BOEM, 2017a).

The Bald Eagle may also be at risk from direct and indirect impacts from spilled oil. This species often captures fish within shallow water areas (snatching prey from the surface or wading into shallow areas to capture prey with their bill) and so may be susceptible to plumage oiling and, as with the Brown and White Pelicans, they may also capture prey that has been physically contaminated with oil or has ingested oil (BOEM, 2017a). It is expected that impacts to coastal birds from a large oil spill resulting in the death of individual birds would be adverse but not significant at population levels.

## C.5 Fisheries Resources

### C.5.1 Pelagic Communities and Ichthyoplankton

Biggs and Ressler (2000) reviewed the biology of pelagic communities in the deepwater environment of the northern Gulf of Mexico. The biological oceanography of the region is dominated by the influence of the Loop Current, whose surface waters are among the most oligotrophic in the world's oceans. Superimposed on this low-productivity condition are productive "hot spots" associated with entrainment of nutrient-rich Mississippi River water and mesoscale oceanographic features. Anticyclonic and cyclonic hydrographic features play an important role in determining biogeographic patterns and controlling primary productivity in the northern Gulf of Mexico (Biggs and Ressler, 2000).

Most fishes inhabiting shelf or oceanic waters of the Gulf of Mexico have planktonic eggs and larvae (Ditty, 1986, Ditty et al., 1988, Richards et al., 1989, Richards et al., 1993). A study by Ross et al. (2012) on midwater fauna to characterize vertical distribution of mesopelagic fishes in selected deepwater areas in the Gulf of Mexico substantiated high species richness but general domination by relatively few families and species.

IPFs that potentially may affect pelagic communities and ichthyoplankton include drilling rig presence, marine sound, and lights; effluent discharges; water intake; and two types of accidents – a small fuel spill and a large oil spill. These IPFs with potential impacts listed in **Table 2** are discussed below.

### Impacts of Drilling Rig Presence, Marine Sound, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as a fish aggregating device (FAD). In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990, Higashi, 1994, Relini et al., 1994). Positive fish associations with offshore rigs and platforms in the Gulf of Mexico are well documented (Gallaway and Lewbel, 1982, Wilson et al., 2003, Wilson et al., 2006). The FAD effect could possibly enhance the feeding of epipelagic predators by attracting and concentrating smaller fish species. Drilling rig noise could potentially cause masking in fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014).

The only defined acoustic threshold levels for continuous noise are given by Popper et al. (2014) and apply only to species of fish with swim bladders that provide some hearing (pressure detection) function. Popper et al. (2014) estimated threshold levels of 170 dB re 1 µPa accumulated over a 48 hour period for onset of recoverable injury and 158 dB re 1 µPa accumulated over a 12 hour period for onset temporary auditory threshold shifts. However, no consistent behavioral thresholds for fish have been established (Hawkins and Popper, 2014). Noise may also influence fish behaviors, such as predator-avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010, Bruintjes and Radford, 2013, McLaughlin and Kunc, 2015, Nedelec et al., 2017). Fish aggregating is likely to occur to some degree due to the presence of the drilling rig, but the impacts would be limited in geographic scope and no population level impacts are expected.

Few data exist regarding the impacts of noise on pelagic larvae and eggs. Generally, it is believed that larval fish will have similar hearing sensitivities as adults, but may be more susceptible to barotrauma injuries associated with impulsive noise (Popper et al., 2014). Larval fish were experimentally exposed to simulated impulsive sounds by Bolle et al. (2012). The controlled playbacks produced cumulative exposures of 206 dB re 1 $\mu Pa^2 \cdot s$ but resulted in no increased mortality between the exposure and control groups. Non-impulsive noise sources (such as drilling rig operations) are expected to be far less injurious than impulsive noise. Based on transmission loss calculations (see Urick, 1983), open water propagation of noise produced by typical sources with DP thrusters in use during drilling, are not expected to produce received levels greater than 160 dB re 1 µPa beyond 82 ft (25 m) from the source. Because of the limited propagation distances of drilling rig-produced high sound pressure levels in conjunction with the periodic and transient nature of ichthyoplankton, no impacts to these life stages are expected.

### Impacts of Effluent Discharges

Muds and cuttings discharges may have a slight effect on the benthic environment near the wellsite, including a localized increase in water turbidity, the limited blanketing of seafloor sediments and slightly increased concentrations of hydrocarbons and metals. Contaminants released into the water column will be diluted rapidly within the open ocean environment. Minimal impacts on benthic organisms are anticipated.

Treated sanitary and domestic wastes may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. These wastes may have elevated levels of nutrients, organic matter, and chlorine, but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on pelagic communities and ichthyoplankton are anticipated.

Deck drainage may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. Deck drainage from contaminated areas will be passed through an oil-and-water separator prior to release, and discharges will be monitored for visible sheen. The discharges may have slightly elevated levels of hydrocarbons but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on pelagic communities and ichthyoplankton are anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water, are expected to be diluted rapidly and have little or no impact on water column biota.

### Impacts of Water Intake

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. The intake of seawater for cooling water will entrain plankton. The low intake velocity should allow most strong-swimming juvenile fishes and smaller adults to escape entrainment or impingement (Electric Power Research Institute, 2000). However, drifting plankton would not be able to escape entrainment with the exception of a few fast-swimming larvae of certain taxonomic groups. Those organisms entrained may be stressed or killed (Cada, 1990, Mayhew et al., 2000), primarily through changes in water temperature during the route from cooling intake structure to discharge structure and mechanical damage (turbulence in pumps and condensers). Due to the limited scope and short duration of drilling activities, any short-term impacts of entrainment are not expected to be biologically significant to plankton populations (BOEM, 2017a, b). The DP drillship or semisubmersible drilling rig ultimately chosen for this project is expected to be in compliance with all cooling water intake requirements.

### Impacts of a Small Fuel Spill

Potential spill impacts on fisheries resources are discussed by BOEM (2017a, b). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by BP's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of BP's OSRP is expected to mitigate the potential for impacts on pelagic communities, including ichthyoplankton. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on pelagic communities and ichthyoplankton. Due to the limited areal extent and short duration of water quality impacts, a small fuel spill would be unlikely to produce detectable impacts.

### Impacts of a Large Oil Spill

Potential spill impacts on pelagic communities and ichthyoplankton are discussed by BOEM (2017a). A large oil spill could affect water column pelagic communities including phytoplankton, zooplankton, ichthyoplankton, and nekton. A large spill that persisted for weeks or months would be more likely to affect these communities. While adult and juvenile fishes may actively avoid a large spill, planktonic eggs and larvae would be unable to avoid contact with oil. Eggs and larvae of fishes are especially vulnerable to oiling because they inhabit the upper layers of the water column, and they will die if exposed to certain toxic fractions of spilled oil. Impacts potentially would be greater if local-scale currents retained planktonic larval assemblages (and the floating oil slick) within the same water mass. Impacts to ichthyoplankton from a large spill would be greatest during spring and summer when shelf concentrations peak (BOEM, 2016b).

## C.5.2 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity. Under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, federal agencies are required to consult on activities that may adversely affect EFH designated in Fishery Management Plans developed by the regional Fishery Management Councils.

The Gulf of Mexico Fishery Management Council (GMFMC) has prepared Fishery Management Plans for corals and coral reefs, shrimps, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum. In 2005, the EFH for these managed species was redefined in Generic Amendment No. 3 to the various Fishery Management Plans (Gulf of Mexico Fishery Management Council, 2005). The EFH for most of these GMFMC-managed species is on the continental shelf in waters shallower than 183 m (600 ft). The shelf edge is the outer boundary for coastal migratory pelagic fishes, reef fishes, and shrimps. EFH for corals and coral reefs includes some shelf-edge topographic features on the Texas-Louisiana OCS located approximately 44 statute miles (71 km) north of the project area (**Figure 4**).

Highly migratory pelagic fishes, which occur as transients in the project area, are the only remaining group for which EFH has been identified in the deepwater Gulf of Mexico. Species in this group, including tunas, swordfishes, billfishes, and sharks, are managed by NMFS. **Table 8** lists the highly migratory fish species and their life stages with EFH at or near the project area.

Table 8. Migratory fish species with designated Essential Fish Habitat (EFH) at or near Mississippi Canyon Block 562, including life stage(s) potentially present within the project area (Adapted from National Marine Fisheries Service [NMFS], 2009b).

| Common Name | Scientific Name | Life Stage(s) Potentially Present Within or Near the Project Area |
|---|---|---|
| Atlantic bluefin tuna | *Thunnus thynnus* | Spawning, eggs, larvae, adults |
| Bigeye tuna | *Thunnus obesus* | Juveniles, adults |
| Bigeye thresher shark | *Alopias superciliosus* | All |
| Blue marlin | *Makaira nigricans* | Juveniles, adults |
| Longbill spearfish | *Tetrapturus pfluegeri* | Juveniles, adults |
| Longfin mako shark | *Isurus paucus* | All |
| Oceanic whitetip shark | *Carcharhinus longimanus* | All |
| Skipjack tuna | *Katsuwonus pelamis* | Spawning |
| Swordfish | *Xiphias gladius* | Larvae, juveniles, adults |
| Whale shark | *Rhincodon typus* | All |
| White marlin | *Tetrapturus albidus* | Juveniles, adults |
| Yellowfin tuna | *Thunnus albacares* | Spawning, juveniles, adults |

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna (*Thunnus thynnus*), and (NMFS, 2009b) has designated a Habitat Area of Particular Concern (HAPC) for this species. The HAPC covers much of the deepwater Gulf of Mexico, including the project area (**Figure 4**). The areal extent of the HAPC is approximately 300,000 km$^2$ (115,830 mi$^2$). The prevailing assumption is that Atlantic bluefin tuna follow an annual cycle of foraging in June through March off the eastern U.S. and Canadian coasts, followed by migration to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009b). The Atlantic bluefin tuna has also been designated as a species of concern (NMFS, 2011). An amendment to the original EFH Generic Amendment was finalized in 2005 (Gulf of Mexico Fishery Management Council, 2005). One of the most significant changes in this amendment reduced the extent of EFH relative to the 1998 Generic Amendment by removing the EFH description and identification from waters between 100 fathoms and the seaward limit of the Exclusive Economic Zone. The Highly Migratory Species Fisheries Management Plan was amended in 2009 to update EFH and HAPC to include the bluefin tuna spawning area (NMFS, 2009b).

NTLs 2009-G39 and 2009-G40 that provide guidance and clarification of the regulations with respect to biologically sensitive underwater features and areas and benthic communities that are considered EFH. As part of an agreement between BOEM and NMFS to complete a new programmatic EFH consultation for each new Five-Year Program, an EFH consultation was initiated between BOEM's Gulf of Mexico Region and NOAA's Southeastern Region during the preparation, distribution, and review of BOEM's 2017-2022 Multisale EIS (BOEM, 2017a). The EFH assessment was completed and there is ongoing coordination among NMFS, BOEM, and BSEE, including discussions of mitigation to prevent impact on highly migratory species from oil and gas activities (BOEM, 2016c).

Other HAPCs have been identified by the Gulf of Mexico Fishery Management Council (2005). These include the Florida Middle Grounds, Madison-Swanson Marine Reserve, Tortugas North and South Ecological Reserves, Pulley Ridge, and several individual reefs and banks of the northwestern Gulf of Mexico. Madison Swanson Marine Reserve is the HAPC located nearest to the project area (approximately 153 statute miles [246 km]).

IPFs that potentially may affect EFH include drilling rig presence, marine sound, and lights; effluent discharges; water intake; and two types of accidents – a small fuel spill and a large oil spill.

### Impacts of Drilling Rig Presence, Underwater Sound, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as an FAD. In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990, Higashi, 1994, Relini et al., 1994). The FAD effect would possibly enhance feeding of epipelagic predators by attracting and concentrating smaller fish species.

Drilling rig vessel noise could potentially cause acoustic masking for fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014). Noise may also influence fish behaviors such as predator avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010, Bruintjes and Radford, 2013, McLaughlin and Kunc, 2015, Nedelec et al., 2017). Because the drilling rig is temporary and short propagation distances of high sound pressure levels from the drilling rig, any impacts to EFH for highly migratory pelagic fishes are considered minor.

### Impacts of Effluent Discharges

Other effluent discharges affecting EFH by diminishing ambient water quality include drilling muds and cuttings, treated sanitary and domestic wastes, deck drainage, and miscellaneous discharges such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water. Impacts on water quality have been discussed previously. No significant impacts on EFH for highly migratory pelagic fishes are expected from these discharges.

### Impacts of Water Intake

As noted previously, cooling water intake will cause entrainment and impingement of plankton, including fish eggs and larvae (ichthyoplankton). Due to the limited scope and short duration of drilling activities, any short-term impacts on EFH for highly migratory pelagic fishes are not expected to be biologically significant. Lease sale EIS (BOEM, 2017a) discusses cooling water discharge. Water with an elevated temperature may accumulate around the discharge pipe. However, the warmer water should be diluted rapidly to ambient temperature levels within 100 m (328 ft) of the discharge pipe. Any impacts to pelagic species (e.g., *Sargassum*) would be extremely localized and brief (BOEM, 2014).

### Impacts of a Small Fuel Spill

Potential spill impacts on EFH are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by BP's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of BP's OSRP is expected to help diminish the potential for impacts on EFH. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on EFH for highly migratory pelagic fishes, including tunas, swordfishes, billfishes, and sharks. These species occur as transients in the project area. A spill would produce short-term impact on water quality in a small portion of the HAPC for spawning bluefin tuna, which covers approximately 115,830 miles$^2$ (300,000 km$^2$) of the deepwater Gulf of Mexico.

A small fuel spill would likely not affect EFH for corals and coral reefs, the nearest EFH being the topographic features located approximately 44 statute miles (71 km) north of the project area. A small fuel spill would float and dissipate on the sea surface and would not contact these features.

### Impacts of a Large Oil Spill

Potential spill impacts on EFH are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to EFH.

An oil spill in offshore waters would temporarily increase hydrocarbon concentrations on the water surface and potentially in the subsurface as well. Given the extent of EFH designations in the Gulf of Mexico (Gulf of Mexico Fishery Management Council, 2005, NMFS, 2009b), some impact on EFH would be unavoidable.

A large spill could affect EFH for many managed species including shrimps, stone crab, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum. It would result in adverse impacts on water quality and water column biota including phytoplankton, zooplankton, and nekton. In coastal waters, sediments could be contaminated and result in persistent degradation of the seafloor habitat for managed demersal fish and shellfish species.

The project area is within the HAPC for spawning Atlantic bluefin tuna (NMFS, 2009b). A large spill could temporarily degrade the HAPC due to increased hydrocarbon concentrations in the water column, with the potential for lethal or sublethal impacts on spawning tuna. Potential impacts would depend in part on the timing of a spill, as this species migrates to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009b).

The topographic features located 44 statute miles (71 km) north of the project area are designated as EFH under the corals and coral reefs management plan (Gulf of Mexico Fishery Management Council, 2005). An accidental spill would be unlikely to affect this area, since a surface slick would be unlikely to reach these features due to their depth.

## C.6 Archaeological Resources

### C.6.1 Shipwreck Sites

MC 562 is on the list of archaeology survey blocks with a high potential for historic shipwrecks (BOEM, 2011). The archeological assessment identified no archaeologically significant artifacts or shipwrecks within 610 m (2,000 ft) of the proposed wellsite based on an autonomous underwater vehicle survey (BP, 2018). It is expected that BP will abide by the applicable requirements of NTL 2005-G07 and 30 CFR 550.194(c), which stipulate that work be stopped at the project site if any previously undetected archaeological resource is discovered after work has begun until appropriate surveys and evaluations have been completed.

Because there are no shipwreck sites within 610 m (2,000 ft) of the proposed wellsite, there are no routine IPFs that are likely to affect shipwrecks. Impacts of a large oil spill are the only IPFs considered. A small fuel spill would not affect shipwrecks because the oil would float and dissipate on the sea surface. These IPFs with potential impacts listed in **Table 2** are discussed below.

#### Impacts of a Large Oil Spill

The 2012-2017 Lease Sale EIS (BOEM, 2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300-m (984-ft) radius. Because there are no historic shipwrecks within a 300-m radius of the proposed wellsite, impacts from dispersed sediments would not be relevant. Should there be any indication that potential shipwreck sites could be affected, in accordance with NTL 2005-G07, BP will immediately halt drilling or other project operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor, Leasing and Environment, within 48 hours of its discovery. BP would cease all operations within 305 m (1,000 ft) of the site until the Regional Supervisor provides instructions on steps to take to assess the site's potential historic significance and protect it.

There is the potential for impacts from oil, dispersants, and depleted oxygen levels. These impacts could include chemical contamination as well as alteration of the rates of microbial activity (BOEM, 2017a, b). During the *Deepwater Horizon* incident, subsurface plumes were reported at a water depth of about 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). While the behavior and impacts of subsurface plumes are not well known, a subsurface plume could have the potential to contact shipwreck sites beyond the 300-m (984-ft) radius estimated by BOEM (2012a), depending on its extent, trajectory, and persistence.

A spill entering shallow coastal waters could conceivably contaminate an undiscovered shipwreck site. Based on the 30-day OSRA modeling (**Table 4**), coastal areas would not likely be affected within 3 days; however, Plaquemines and Lafourche Parishes may be affected within 10 days of a spill and coastal areas between Cameron Parish, Louisiana, and Bay County, Florida, may be affected within 30 days (1% to 11% conditional probability). Based on the 60-day OSRA modeling estimates (**Table 5**), the potential shoreline contacts range from Matagorda County, Texas, to Levy County, Florida (up to 24% conditional probability). If an oil spill contacted a coastal historic site, such as a fort or a lighthouse, the impacts may be temporary and reversible (BOEM, 2017a).

### C.6.2 Prehistoric Archaeological Sites

With a water depth of approximately 1,962 m (6,436 ft), the proposed wellsite is well beyond the 60-m (197-ft) depth contour used by BOEM as the seaward extent for potential prehistoric archaeological sites in the Gulf of Mexico. Because prehistoric archaeological sites are not found in the project area, the only relevant IPF is a large oil spill. A small fuel spill would not affect prehistoric archaeological resources because the oil would float and dissipate on the sea surface.

#### Impacts of a Large Oil Spill

Because prehistoric archaeological sites are not found in the project area, they would not be affected by the physical effects of a subsea blowout. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300-m (984-ft) radius.

Along the northern Gulf Coast, prehistoric sites exist along the barrier islands and mainland coast and along the margins of bays and bayous (BOEM, 2017a). Based on the 30-day OSRA modeling (**Table 4**), coastal areas would not likely be affected within 3 days; however, Plaquemines and Lafourche Parishes may be affected within 10 days of a spill and coastal areas between Cameron Parish, Louisiana, and Bay County, Florida, may be affected within 30 days (1% to 11% conditional probability). Based on the 60-day OSRA modeling estimates (**Table 5**), the potential shoreline contacts range from Matagorda County, Texas, to Levy County, Florida (up to 24% conditional probability). If a spill did reach a prehistoric site along these shorelines, it could coat fragile artifacts or site features and compromise the potential for radiocarbon dating organic materials in a site (although other dating methods are available and it is possible to decontaminate an oiled sample for radiocarbon dating). Coastal prehistoric sites could also be damaged by spill cleanup operations (e.g., by destroying fragile artifacts and disturbing the provenance of artifacts and site features).

## C.7 Coastal Habitats and Protected Areas

Coastal habitats in the northeastern Gulf of Mexico that may be affected by oil and gas activities are described by BOEM (2017a, b). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs and submerged seagrass beds. Generally, most of the northeastern Gulf is fringed by barrier beaches, with wetlands, oyster reefs and/or submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries.

Due to the distance from shore, the only IPF associated with routine activities in the project area that potentially may affect beaches and dunes, wetlands, oyster reefs, seagrass beds, coastal wildlife refuges, wilderness areas, or any other managed or protected coastal area is support vessel traffic. The support bases at Port Fourchon and Houma, Louisiana, are not in wildlife refuges or wilderness areas. Potential impacts of support vessel traffic are addressed briefly below.

Impacts of support vessel traffic and a large oil spill are the only IPFs analyzed. A small fuel spill in the project area would be unlikely to affect coastal habitats, as the project area is 64 statute miles (103 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up. These IPFs with potential impacts listed in **Table 2** are discussed below.

### Impacts of Support Vessel Traffic

Support operations, including crew boats and supply boats as detailed in EP Section 12, may have a minor incremental impact on barrier beaches and dunes, wetlands, oyster reefs and protected areas. Over time, with a large number of vessel trips, vessel wakes can erode shorelines along inlets, channels, and harbors, resulting in localized land loss. Impacts to barrier beaches and dunes, wetlands, oyster reefs and protected areas will be minimized by following the speed and wake restrictions in harbors and channels.

Support operations, including crew boats and supply boats are not anticipated to have a significant impact on submerged seagrass beds. While submerged seagrass beds could be uprooted, scarred, or lost due to direct contact from vessels, use of navigation channels and adherence to local requirements and implemented programs will decrease the likelihood of impacts to these resources (BOEM, 2017a, b).

### Impacts of a Large Oil Spill

Potential spill impacts on coastal habitats are discussed by BOEM (2017a, b). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs and submerged seagrass beds. For this EP, there are no unique site-specific issues with respect to coastal habitats.

The 30-day OSRA modeling (**Table 4**) indicates that Plaquemines Parish, Louisiana, with an 11% conditional probability, is the coastal area most likely to be contacted within 30 days of a spill. The 60-day OSRA (**Table 5**) predicts potential shoreline contact ranging from Matagorda County, Texas, to Levy County, Florida, within 60 days of a spill.

The shorelines within the geographic range predicted by the OSRA modeling (**Tables 4** and **5**) include extensive barrier beaches and wetlands, oyster reefs with submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries. NWRs and other protected areas along the coast are discussed in BOEM (2017a, b) and BP's OSRP. Coastal and near-coastal wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts based on the 30-day OSRA model (**Table 4**) are presented in **Table 9**.

The level of impacts from oil spills on coastal habitats depends on many factors, including the oil characteristics, the geographic location of the landfall, and the weather and oceanographic conditions at the time (BOEM, 2017a, b, c). Oil that makes it to beaches may be either liquid weathered oil, an oil-and-water mousse, or tarballs. Oil is generally deposited on beaches in lines defined by wave action at the time of landfall. Oil that remains on the beach will thicken as its volatile components are lost. Thickened oil may form tarballs or aggregations that incorporate sand, shell, and other materials into its mass. Tar may be buried to varying depths under the sand. On warm days, both exposed and buried tarballs may liquefy and ooze. Oozing may serve to expand the size of a mass as it incorporates beach materials. Oil on beaches may be cleaned up manually, mechanically, or both. Some oil can remain on the beach at varying depths and may persist for several years as it slowly biodegrades and volatilizes (BOEM, 2017a).

Table 9. Wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts after 30 days of a hypothetical spill from Launch Area 59 based on the 30-day Oil Spill Risk Analysis model.

| County or Parish, State | Wildlife Refuge, Wilderness Area, or State/National Park |
|---|---|
| Cameron, Louisiana | Sabine National Wildlife Refuge |
| | Rockefeller State Wildlife Refuge and Game Preserve |
| | Peveto Woods Sanctuary |
| Vermilion, Louisiana | Paul J. Rainey Wildlife Refuge and Game Preserve |
| | Rockefeller State Wildlife Refuge and Game Preserve |
| | State Wildlife Refuge |
| Terrebonne, Louisiana | Isles Dernieres Barrier Islands Refuge |
| | Pointe aux Chenes Wildlife Management Area |
| Lafourche, Louisiana | East Timbalier Island National Wildlife Refuge |
| | Pointe aux Chenes Wildlife Management Area |
| | Wisner Wildlife Management Area (Includes Picciola Tract) |
| Jefferson, Louisiana | Grand Isle State Park |
| Plaquemines, Louisiana | Breton National Wildlife Refuge |
| | Delta National Wildlife Refuge |
| | Pass a Loutre Wildlife Management Area |
| St. Bernard, Louisiana | Biloxi Wildlife Management Area |
| | Breton National Wildlife Refuge |
| | Saint Bernard State Park |
| Walton, Florida | Choctawhatchee River Delta Preserve |
| | Choctawhatchee River Water Management Area |
| | Deer Lake State Park |
| | Grayton Beach State Park |
| | Point Washington State Forest |
| | Topsail Hill Preserve State Park |
| Bay, Florida | Camp Helen State Park |
| | SS Tarpon Underwater Archaeological Preserve |
| | St. Andrews Aquatic Preserve |
| | St. Andrews State Park |
| | Vamar Underwater Archaeological Preserve |

Coastal wetlands are highly sensitive to oiling and can be significantly affected because of the inherent toxicity of hydrocarbon and non-hydrocarbon components of the spilled substances (Beazley et al., 2012, Lin and Mendelssohn, 2012, Mendelssohn et al., 2012). Numerous variables such as oil concentration and chemical composition, vegetation type and density, season or weather, preexisting stress levels, soil types, and water levels may influence the impacts of oil exposure on wetlands. Light oiling could cause plant die back, followed by recovery in a fairly short time. Vegetation exposed to oil that persists in wetlands could take years to recover (BOEM, 2017a, b). In addition to the direct impacts of oil, cleanup activities in marshes may accelerate rates of erosion and retard recovery rates (BOEM, 2017a). Impacts associated with an extensive oiling of coastal wetland habitat from a large oil spill may be significant.

A review of studies by BOEM (2012a) determined that effects of oil on marsh vegetation depend on the type of oil, the type of vegetation, and environmental factors of the area. Impacts to slightly oiled vegetation are considered short term and reversible as recent studies suggest that they will experience plant die-back, followed by recovery without replanting (BOEM, 2012a).

Vegetation coated with oil experiences the highest mortality rates due to decreased photosynthesis (BOEM, 2012a). A recent review of the literature and new studies indicated that oil spill impacts to seagrass beds are often limited and may be limited to when oil is in direct contact with these plants (Fonseca et al., 2017). This conclusion is supported by the findings of Kenworthy et al. (2017) who reported that oil exposure following the Macondo spill did not result in shelf-wide seagrass declines in the Chandeleur Islands, Louisiana. Impacts associated with an extensive oiling of coastal wetland habitat from a large oil spill are expected to be significant.

# C.8 Socioeconomic and Other Resources

## C.8.1 Recreational and Commercial Fishing

Potential impacts to recreational and commercial fishing are analyzed by BOEM (2017a, b). The main commercial fishing activity in deep waters of the northern Gulf of Mexico is pelagic longlining for tunas, swordfishes, and other billfishes (Continental Shelf Associates, 2002). Pelagic longlining has occurred historically in the project area, primarily during spring and summer. In August 2000, the federal government closed two areas in the northeastern Gulf of Mexico to longline fishing (65 FR 47214). The lease is outside of the closure areas.

Longline gear consists of monofilament line deployed from a moving vessel and generally allowed to drift for 4 to 5 hours (Continental Shelf Associates, 2002). As the mainline is put out, baited leaders and buoys are clipped in place at regular intervals. It takes 8 to 10 hours to deploy a longline and about the same time to retrieve it. Longlines are often set near oceanographic features such as fronts or downwellings, with the aid of sophisticated on-board temperature sensors, depth finders, and positioning equipment. Vessels typically are 10 to 30 m (33 to 98 ft) long, and their trips last from about 1 to 3 weeks.

It is unlikely that any commercial fishing activity other than longlining occurs at or near the project area. Benthic species targeted by commercial fishers occur on the upper continental slope, well inshore of the project area. Royal red shrimp (*Pleoticus robustus*) are caught by trawlers in water depths of about 250 to 550 m (820 to 1,804 ft). Tilefishes (primarily *Lopholatilus chamaeleonticeps*) are caught by bottom longlining in water depths from about 165 to 450 m (540 to 1,476 ft) (Continental Shelf Associates, 2002).

Most recreational fishing activity in the region occurs in water depths less than 200 m (656 ft) (Continental Shelf Associates, 1997, 2002). In deeper water, the main attraction to recreational fishers would be petroleum platforms offshore Texas and Louisiana. Due to the distance from shore, it is unlikely that recreational fishing activity is occurring in the project area.

The only routine IPF that potentially may affect fisheries is drilling rig presence (including marine sound and lights). Two types of potential accidents are also addressed below – a small fuel spill and a large oil spill. These IPFs with potential impacts listed in **Table 2** are discussed below.

### Impacts of Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

There is a slight possibility of pelagic longlines becoming entangled in the drilling rig. For example, in January 1999, a portion of a pelagic longline snagged on the acoustic Doppler current profiler of a drillship working in the Gulf of Mexico (Continental Shelf Associates, 2002). The line was removed without incident. Generally, longline fishers use radar and are aware of offshore structures and ships when placing their sets. Therefore, little or no impact on pelagic longlining is expected from the proposed project.

Because it is unlikely that any recreational fishing activity is occurring in the project area, no adverse impacts are anticipated. Other factors such as effluent discharges are likely to have negligible impacts on commercial or recreational fisheries due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges.

### Impacts of a Small Fuel Spill

The probability of a fuel spill is expected to be minimized by BP's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of BP's OSRP is expected to potentially mitigate and reduce the potential for impacts.
EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

Pelagic longlining activities in the project area, if any, could be interrupted in the event of a small fuel spill. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions (see **Section A.9.1**). Fishing activities could be interrupted due to the activities of response vessels operating in the project area. A small fuel spill would not affect coastal water quality because the spill would not be expected to make landfall or reach coastal waters prior to breaking up (see **Section A.9.1**).

### Impacts of a Large Oil Spill

Potential spill impacts on fishing activities are discussed by BOEM (2017a, b). For this EP, there are no unique site-specific issues with respect to this activity.

Pelagic longlining activities in the project area and other fishing activities in the northern Gulf of Mexico could be interrupted in the event of a large oil spill. A spill may or may not result in fishery closures, depending on the duration of the spill, the oceanographic and meteorological conditions at the time, and the effectiveness of spill response measures. The *Deepwater Horizon* incident provides information about the maximum potential extent of fishery closures in the event of a large oil spill in the Gulf of Mexico (NMFS, 2010b). At its peak on 12 July 2010, closures encompassed 217,821 $km^2$ (84,101 $mi^2$), or 34.8% of the U.S. Gulf of Mexico Exclusive Economic Zone.

According to BOEM (2012a, 2017a), the potential impacts on commercial and recreational fishing activities from an accidental oil spill are anticipated to be minimal because the potential for oil spills is very low, the most typical events are small and of short duration, and the effects are so localized that fishes are typically able to avoid the affected area. Fish populations may be affected by an oil spill event should it occur, but they would be primarily affected if the oil reaches the productive shelf and estuarine areas where many fishes spend a portion of their life cycle (BOEM, 2012a). The probability of an offshore spill affecting these nearshore environments is low. Should a large oil spill occur, economic impacts on commercial and recreational fishing activities would likely occur, but are difficult to predict because impacts would differ by fishery and season (BOEM, 2016b).

## C.8.2 Public Health and Safety

There are no IPFs associated with routine operations that are expected to affect public health and safety. Impacts of a small fuel spill and a large oil spill are addressed below. A small fuel spill would be unlikely to cause any impacts on public health and safety because it would affect only a small area of the open ocean 64 statute miles (103 km) from the nearest shoreline, and nearly all of the diesel fuel would evaporate or disperse within 24 hours (see **Section A.9.1**).

### Impacts of a Large Oil Spill

In the event of a large spill from a blowout, the main safety and health concerns are those of the offshore personnel involved in the incident and those responding to the spill. Once released into the water column, crude oil weathers rapidly (National Research Council, 2003a). Depending on many factors such as spill rate and duration, the physical/chemical characteristics of the oil, meteorological, and oceanographic conditions at the time, and the effectiveness of spill response measures, weathered oil may remain present on the sea surface and reach coastal shorelines.

Based on data collected during the Deepwater Horizon Incident, the health risks resulting from a large oil spill appear to be minimal (Centers for Disease Control and Prevention, 2010). Health risks for spill responders and wildlife rehabilitation workers responding to a major oil spill are similar to the health risks incurred by response personnel during any large-scale emergency or disaster response (U.S. Department of Homeland Security, 2014), which includes the following:

- Possible accidents associated with response equipment;
- Hand, shoulder, or back pain, along with scrapes and cuts;
- Itchy or red skin or rashes due to potential chemical exposure;
- Heat or cold stress depending upon the working environment; and
- Possible upper respiratory symptoms due to potential dust inhalation, allergies, or potential chemical exposure.

## C.8.3 Employment and Infrastructure

There are no IPFs associated with routine operations that are expected to affect employment and infrastructure. The project involves drilling with support from existing shorebase facilities in Louisiana. No new or expanded facilities will be constructed, and no new employees are expected to move permanently into the area. The project will have a negligible impact on socioeconomic conditions such as local employment, existing offshore and coastal infrastructure (including major sources of supplies, services, energy, and water), and minority and lower income groups. Impacts of a large oil spill are addressed below. A small fuel spill that dissipates within a few days would have little or no economic impact as the spill response would use existing facilities, resources, and personnel.

### Impacts of a Large Oil Spill

Potential socioeconomic impacts of an oil spill are discussed by BOEM (2017a, b). For this EP, there are no unique site-specific issues with respect to employment and coastal infrastructure. A large spill could cause economic impacts in several ways: it could result in extensive fishery closures that put fishermen out of work; it could result in temporary employment as part of the response effort (including the establishment of spill response staging areas); it could result in adverse publicity that affects employment in coastal recreation and tourism industries; and it could result in suspension of OCS drilling activities, including service and support operations that are an important part of local economies.

### C.8.4 Recreation and Tourism

There are no known recreational uses of the project area. Recreational resources and tourism in coastal areas would not be affected by any routine activities due to the distance from shore. Compliance with NTL BSEE-2015-G03 is expected to minimize the chance of trash or debris being lost overboard from the drilling rig and subsequently washing up on beaches. A small fuel spill in the project area would be unlikely to affect recreation and tourism because, as explained in **Section A.9.1**, it would not be expected to make landfall or reach coastal waters prior to dispersing naturally.

#### Impacts of a Large Oil Spill

Potential impacts of an oil spill on recreation and tourism are discussed by BOEM (2017a, b). For this EP, there are no unique site-specific issues with respect to these impacts.

Impacts on recreation and tourism would vary depending on the duration of the spill and its fate including the effectiveness of response measures. A large spill that reached coastal waters and shorelines could adversely affect recreation and tourism by contaminating beaches and wetlands, resulting in negative publicity that encourages people to stay away. The 30-day OSRA modeling (**Table 4**) indicates that Plaquemines Parish, Louisiana is the area most likely to be contacted by oil from a spill. The 60-day OSRA (**Table 5**) predicts potential shoreline contact ranging from Matagorda County, Texas, to Levy County, Florida.

According to BOEM (2017a, b), should an oil spill occur and contact a beach area or other recreational resource, it could cause some disruption during the impact and cleanup phases of the spill. In the unlikely event that a spill occurs that is sufficiently large to affect large areas of the coast and, through public perception, have effects that reach beyond the damaged area, effects to recreation and tourism could be significant (BOEM, 2012a).

### C.8.5 Land Use

Land use along the northern Gulf coast is discussed by BOEM (2017a, b). There are no routine IPFs that potentially may affect land use. The project will use existing onshore support facilities in Louisiana. The land use at the existing shorebase sites is industrial. The project will not involve any new construction or changes to existing land use and, therefore, will not have any impacts. Levels of boat and helicopter traffic as well as demand for goods and services including scarce coastal resources, will represent a small fraction of the level of activity occurring at the shorebases.

A large oil spill is the only relevant IPF. A small fuel spill would not have any impacts on land use, as the response would be staged out of existing shorebases and facilities.

#### Impacts of a Large Oil Spill

The initial response for a large oil spill would be staged out of existing facilities, with no effect on land use. A large spill could have limited temporary impacts on land use along the coast if additional staging areas were needed. For example, during the *Deepwater Horizon* incident, temporary staging areas were established in Louisiana, Mississippi, Alabama, and Florida for spill response and cleanup efforts. In the event of a large spill in the project area, similar temporary staging areas could be needed. These areas would eventually return to their original use as the response is demobilized. It is not expected that a large oil spill and subsequent cleanup would substantially reduce available space in nearby landfills or decrease their usable life (BOEM, 2014).

An accidental oil spill is not likely to significantly affect land use and coastal infrastructure in the region, in part because an offshore spill would have a small probability of contacting onshore resources. BOEM (2016b) states that landfill capacity would probably not be an issue at any phase of an oil spill event or the long-term recovery. In the case of the *Deepwater Horizon* incident and response, the USEPA reported that existing landfills receiving oil spill waste had plenty of capacity to handle waste volumes; the wastes that were disposed of in landfills represented less than 7% of the total daily waste normally accepted at these landfills (USEPA, 2016).

### C.8.6 Other Marine Uses

The closest existing infrastructure to the proposed wellsite is an infield oil flowline approximately 23 m (80 ft) to the northwest, the Isabela Plem 2 approximately 27 m (90 ft) to the northwest, the Isabela flowline jumper approximately 30m (100 ft) to the west, and the existing MC 562-1 wellhead approximately 58 m (190 ft) to the northwest (BP, 2018). The archaeological survey as summarized in BP (2018) reported no archaeologically significant sonar contacts were identified within 610 m (2,000 ft) of the proposed wellsite.

There are no IPFs from routine project activities that are likely to affect other marine uses of the project area. A large oil spill is the only relevant accident IPF. A small fuel spill would not have any impacts on other marine uses because spill response activities would be mainly within the project area and the duration would be brief.

#### Impacts of a Large Oil Spill

An accidental spill would be unlikely to significantly affect shipping or other marine uses. The block is not located within any USCG-designated fairway, shipping lane, or Military Warning Area. In the event of a large spill requiring numerous response vessels, coordination would be required to manage the vessel traffic for safe operations. BP intends to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

In the event of a large spill requiring numerous vessels in the area, coordination would be required to ensure that no anchoring or seafloor-disturbing activities occur near the existing infrastructure.

## C.9 Cumulative Impacts

For purposes of the National Environmental Policy Act, a cumulative impact is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Any single activity or action may have a negligible impact(s) by itself, but when combined with impacts from other activities in the same area and/or time period, substantial impacts may result.

**Prior Studies**. BOEM prepared a multi-lease sale EIS in which it analyzed the environmental impact of activities that might occur in the multi-lease sale area. The level and types of activities planned in BP's EP are within the range of activities described and evaluated by BOEM in the 2017 to 2022 Programmatic EIS for the Outer Continental Shelf (OCS) Oil and Gas Leasing Program (BOEM, 2016a), and the Final Programmatic EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2017-2022 (BOEM, 2017a). Past, present, and reasonably foreseeable activities were identified in the cumulative effects scenario of these documents, which are incorporated by reference. The proposed action should not result in any additional impacts beyond those evaluated in the multi-lease sale and Final EISs (BOEM, 2012a, 2013, 2014, 2015, 2016b, 2017a, b).

**Description of Activities Reasonably Expected to Occur in the Vicinity of Project Area**. Other exploration and development activities may occur in the vicinity of the project area. BP does not anticipate other projects in the vicinity of the project area beyond the types of projects analyzed in the lease sale and Supplemental EISs (BOEM, 2012a, 2013, 2014, 2015, 2016b, 2017a, b).

**Cumulative Impacts of Activities in this EP.** The BOEM (2017a) Final EIS included a discussion of cumulative impacts, which analyzed the environmental and socioeconomic impacts from the incremental impact of the 10 proposed lease sales, in addition to all activities (including non-OCS activities) projected to occur from past, proposed, and future lease sales. The EISs considered exploration, delineation, and development wells; platform installation; service vessel trips; and oil spills. The EISs examined the potential cumulative effects on each specific resource for the entire Gulf of Mexico.

The level and type of activity proposed in BP's EP are within the range of activities described and evaluated in the recent lease sale EISs. The EIA incorporates and builds on these analyses by examining the potential impacts on physical, biological, and socioeconomic resources from the work planned in this EP, in conjunction with the other reasonably foreseeable activities expected to occur in the Gulf of Mexico. Thus, for all impacts, the incremental contribution of BP's proposed actions to the cumulative impacts analysis in these prior analyses is not expected to be significant.

# D. Environmental Hazards

## D.1 Geologic Hazards

The site clearance letter provided by BP concluded that the proposed wellsite is generally favorable for drilling (BP, 2018). See EP Section 3 for supporting geological and geophysical information.

## D.2 Severe Weather

Under most circumstances, weather is not expected to have any effect on the proposed activities. Extreme weather, including high winds, strong currents, and large waves, was considered in the design criteria for the drilling rig selected for this project. High winds and limited visibility during a severe storm could disrupt support activities (vessel and helicopter traffic) and make it necessary to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes. BP has several contingency plans in place to address unexpected conditions. In the event of severe weather, guidance as outlined in BP's and/or BP's drilling contractor's site specific EEP, its site specific hurricane preparation checklist and Gulf of Mexico Region Severe Weather Contingency Plan would be adhered to.

### D.3 Currents and Waves

Metocean conditions such as sea states, wind speed, ocean currents, etc. will be continuously monitored. Under most circumstances, physical oceanographic conditions are not expected to have any effect on the proposed activities. Strong currents (e.g., caused by Loop Current eddies and intrusions) and large waves were considered in the design criteria for the drilling rig selected for this project. High waves during a severe storm could disrupt support activities (i.e., vessel and helicopter traffic), and risks to the drilling program brought on by such conditions would be closely monitored and managed by the team managing the project. In some cases, it may be necessary to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes.

## E. Alternatives

No formal alternatives were evaluated in the EIA for the proposed project. However, various technical and operational options, including the location of the wellsite and the selection of a potential drilling unit, were considered by BP. The activity being proposed is the result of a rigorous screening and right-scoping process. It was selected as the best design candidate to reduce risk and optimize deliverability, chosen from numerous options with varying well locations, trajectories, construction designs, and drilling strategies, amongst other variables.

## F. Mitigation Measures

The proposed program includes numerous processes and actions that are required by laws, regulations, and BOEM lease stipulations and NTLs to mitigate potential impact to the environment. The project is intended to comply with all applicable federal, state, and local requirements concerning air pollutant emissions, discharges to water, and waste management. BP also has internal conformance requirements and standard operating procedures and practices that will be abided by. In addition, BP and its drilling contractor intend to implement the following specific measures to prevent marine pollution:

- Proper job planning is an important overall mitigation measure. The fundamental concept and discussion in the pre-tour and pre-job safety meetings is the prevention of harm to people or the environment. Personnel are reminded daily to inspect work areas for potential pollution and safety issues.
- Per Safety and Environmental Management System (SEMS) requirements, the skills and knowledge of personnel are assessed prior to working offshore for BP.
- Equipment transferred to and from the drilling rig will be inspected to ensure pollution pans have been cleaned and to confirm that plugs have been installed prior to leaving the dock and prior to loading on the boat.

- Preventive maintenance of rig equipment and other service equipment, including visual inspection of hydraulic lines and reservoirs, will be conducted on a scheduled basis.
- Items deemed safety and environmentally critical are listed and managed on a schedule recommended by the manufacturer/operator.
- Waste generation and storage will be managed as per the BP Gulf of Mexico Waste Management procedures and/or the drilling contractor's established waste management procedures. Wastes are expected to be properly categorized, packaged, labeled, stored, manifested, and shipped to an appropriately permitted disposal site.
- Drums will be stored in containment areas, and fuel vents will have containment boxes.
- Trash containers will be kept covered. Trash will be disposed of in a compactor and shipped to shore via a rig support vessel.
- Tank overflow, discharge overflow spill prevention fittings as well as quick disconnect hoses will be installed on all hydrocarbon-based fluid hoses and liquid mud hoses to ensure isolation of any hose failures.
- On site spill kits are inspected regularly and re-stocked as needed.
- Drills are conducted regularly, engaging the Crisis and Continuity Management and Emergency Response Team onshore to measure the effectiveness and quality of processes deployed to address different emergency scenarios.
- Fuel hoses and SBM hoses will be changed based on the maintenance schedule of the MODU.

# G. Consultation

No persons or agencies other than those listed as Preparers (**Section H**) were consulted during the preparation of the EIA.

# H. Preparers

The EIA was prepared by CSA Ocean Sciences Inc. Contributors included:

- John M. Tiggelaar II (Project Scientist);
- Patrick Connelly (Project Scientist);
- Brent Gore (GIS/Remote Sensing Specialist); and
- Kristen L. Metzger (Library and Information Services Director).

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## Appendix J: Fee Recovery

Pay.gov

# Receipt

## Your payment is complete

Pay.gov Tracking ID: 26948OVP
Agency Tracking ID: 75468587833
Form Name: BOEM Exploration Plan
Application Name: BOEM Exploration Plan - BF

## Payment Information

Payment Type: Debit or credit card
Payment Amount: $3,673.00
Transaction Date: 04/17/2018 08:47:10 PM EDT
Payment Date: 04/17/2018
Region: Gulf of Mexico
Contact: Adalberto Garcia 281-995-2815
Company Name/No: BP Exploration Production Inc., 02481
Lease Number(s): 19966, , , ,
Area-Block: Mississippi Canyon MC, 562: , : , : , : ,
Surface Locations: 1

## Account Information

Cardholder Name: Betsy Cleland
Card Type: Master Card
Card Number: ************8137

## Email Confirmation Receipt

Confirmation Receipts have been emailed to:
adalberto.garcia@bp.com

# Appendix K: New Technology

# MPD for GoM Exploration Wells

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**Context**

Managed Pressure Drilling (MPD) is defined by the International Association of Drilling Contractors (IADC) as "An adaptive drilling process used to precisely control the annular pressure profile throughout the wellbore." The ability to control the annular pressure profile facilitates remaining within the downhole pressure limits imposed by the well's Pore Pressure Fracture Gradient (PPFG) and including additional factors like wellbore stability and trip margin. Managed pressure drilling can be considered as an advanced form of primary well control as it provides the driller the capability to manage the Bottom Hole Pressure (BHP) by precisely controlling the primary barrier. A study conducted by the Drilling Engineers Association on behalf of the U.S. Department of Interior Minerals Management Service concluded "MPD is as safe as or safer than conventional offshore drilling" (Malloy, 2008).

**Background**

BP has been using Surface Back Pressure (SBP) MPD to successfully deliver complex High Pressure High Temperature (HPHT) exploration wells in Egypt since 2007. This MPD method has many advantages for this environment, where geological uncertainty and associated challenges often lead to high Non-Productive Time (NPT) or inability to deliver exploration objectives. BP has also used this method to successfully deliver a shallow water deep gas exploration well in the GoM in 2009. The advantages of this method in exploration wells have long been established, and BP planned to use it on GoM Paleogene exploration wells starting 2015. Following the transfer of operatorship on the Paleogene wells, the plan was put on hold. With new exploration activity in GoM planned to begin in 2018, the use of MPD is planned to facilitate drilling future exploration wells in the deepwater GoM.

It is worth mentioning that the SBP method is not limited to exploration and appraisal wells, and it has been used successfully within BP to drill development wells where the high mud weight required for wellbore stability leads to a narrow drilling window and an increased risk of losses in depleted sands.

**SBP MPD Theory**

SBP MPD, often referred to within the industry as Constant Bottom Hole Pressure (CBHP), uses surface pressure to supplement a lighter than conventional mud weight to maintain an overbalanced condition. This technique enables maintaining a near constant pressure throughout the open hole well bore when both dynamic and static. This prevents the pressure cycling experienced by the open hole well bore which can cause well bore fatigue and lead to underbalanced conditions (i.e. kicks taken at pumps off events). The ability to apply SBP reduces the well control risk of allowing an influx during pumps off events and on trips. The system also provides an early kick and loss detection capability through the use of pressure monitoring and high accuracy flow rate monitors such as a Coriolis meter.

**Benefits of SBP MPD for Exploration wells in GoM**

GoM deepwater exploration wells, particularly sub-salt, face many challenges such as:

1. PPFG uncertainty, particularly with poor seismic imaging sub-salt.
2. Tight operating window between Pore Pressure and Fracture Gradient, in many cases leading to losses or well control issues.

3. Equivalent Circulating Density (ECD) management.
4. Risk and time associated with riser gas events.
5. Wellbore ballooning.
6. Challenges associated with salt exit uncertainty
7. Difficulty tripping out or pumping of hole due to narrow window and swabbing / losses.

SBP MPD allows managing and mitigating these challenges through the ability to control bottomhole pressure and maintain it near constant. Benefits of SBP MPD for exploration wells may include:

1. Early Kick/Loss detection.
2. Fast and Precise control of BHP.
3. Can augment or even replace conventional well control for certain applications.
4. Constant BHP reduces or eliminates ballooning. Unmanageable wellbore ballooning is a common cause for high NPT and failure to reach Total Depth (TD) objectives in exploration and HPHT environments.
5. Allows identification of operating window boundaries. A dynamic Formation Integrity Test (FIT) can be quickly carried out to test wellbore integrity prior to making any changes to mud weight.
6. Allows tripping out with surface pressure to mitigate swabbing effects, instead of pumping out or raising Mud Weight (MW).
7. The SBP system provides a safer and more efficient well and riser degassing method for floating operations.

**BP use of SBP MPD for Exploration wells in GoM**

The SBP MPD method is the MPD method which is most suitable to address the drilling challenges encountered in GoM exploration, as it is more suited to deal with well challenges such as geological uncertainty, tight PPFG window, well bore ballooning and well bore stability with rapid response capabilities to react to changing down hole conditions by adjusting the BHP precisely and quickly. In addition, the SBP MPD system provides additional techniques to examine the well bore boundaries of the PPFG by performing well bore bleed downs and dynamic FITs.

**SBP MPD equipment for Exploration wells in GoM**

The SBP MPD equipment package will be comprised of the following:

- MPD riser stack
- Buffer manifold
- Junk catcher
- MPD choke manifold
- Metering manifold
- Return flow line

The MPD riser stack will be a below tensioner ring design and comprised of (bottom to top) a flow spool which will provide a conduit through 2 X 5 in. ID hoses to the surface equipment. Above the flow spool a riser annular will be installed to enable isolating pressure from the Rotating Control Device (RCD) for RCD bearing change out. Additionally, the riser annular may be used for other pressure control operations when pipe rotation is not necessary. Above the riser annular an API 16RCD monogrammed rotating control device will be installed.

The buffer manifold will be used as the manifold to enable various routings of fluid from or to the well as required by the MPD operation. A junk catcher will be installed next in the primary flow path to prevent the passage of items in the mud which could plug the MPD chokes. The MPD choke manifold is used to regulate the flow of fluid through the flow path and enable the application of SBP. The MPD choke manifold will be equipped with a bypass leg to allow returns to be routed around the chokes as necessary. The return flow will then be routed to an MPD metering manifold which will be equipped with a mass flow meter (Coriolis meter). This manifold will serve to monitor the rate, density and temperature of the returned drilling fluid. Downstream of the metering manifold there will be two flow paths available. The primary flow path will be a return flow line to the rigs shakers. A second flow path will be available to allow routing returns to the rigs MGS to be used as required by the MPD operation.

**Generic SBP MPD Piping and Instrumentation Diagram**