

UNITED STATES GOVERNMENT
MEMORANDUM

September 16, 2026

To: Public Information

From: Plan Coordinator, FO, Plans section (MS 5231)

Subject: Public information copy of plan

Control # S8226

Type Supplemental Development Operations Coordination Document

Lease(s) - OCS-G09866 Block - 776 Mississippi Canyon Area
OCS-G09867 Block - 777 Mississippi Canyon Area
OCS-G09868 Block - 778 Mississippi Canyon Area
OCS-G14658 Block - 822 Mississippi Canyon Area

Operator - BP EXPLORATION & PRODUCTION INC

Description - Installation of 4 new LT Pipelines and subsea pump station;
drilling and completion of wells AA, AB, AH, G, H, K & L within
the approved air emissions through the end of 2032.

Rig Type - Not Found

Attached is a copy of the subject plan.

It has been deemed submitted and is under review for approval.

Henry Emembolu
Plan Coordinator

Gulfof**Mexico**



**BP Exploration & Production Inc.
Gulf of Mexico**

**Supplemental
Development Operations Coordination Document
Thunder Horse**

Mississippi Canyon Blocks:

MC 775, OCS-G 19997

MC 776, OCS-G 09866

MC 777, OCS-G 09867

MC 778, OCS-G 09868

MC 821, OCS-G 14657

MC 822, OCS-G 14658

MC 777 Unit, Agreement No. 754398003

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0	5/11/2026	Issued for Use	Amanda Phythian	Kevin Stanley
Rev	Date	Document Status	Custodian/Owner	Authority

Document Control Number	Project ID 2700	Discipline ID	Document Type	Originator ID	Sequence Number	Document Revision

AMENDMENT RECORD

Amendment Date	Revision Number	Amender Initials	Amendment

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Security Classification:	BP Internal	Page:	Page 2 of 39
Uncontrolled when printed or stored locally			

TABLE OF CONTENTS

1	Plan Contents	5
1.1	History of Unit Lease	5
1.2	Description of Activities.....	7
1.3	Location Information	8
1.4	Safety and Pollution Prevention Features.....	8
1.5	Storage Tanks and Production Vessels.....	8
1.6	Additional Measures	9
2	General Information	9
3	Geological and Geophysical Information (30 CFR 550.244)	14
4	Hydrogen Sulfide (H₂S) Information (30CFR 550.245).....	15
4.1	Concentration.....	15
4.2	Classification.....	15
4.3	H ₂ S Contingency Plan	15
4.4	Modeling Report.....	16
5	Mineral Resource Conservation Information (30 CFR 550.246)	16
6	Biological Information (30 CFR 550.247).....	16
7	Wastes and Discharges Information (30 CFR 550.248)	22
8	Air Emissions (30 CFR 550.249)	22
9	Oil Spill Information (30 CFR 550.250).....	23
10	Environmental Monitoring and Environmental Mitigation Measures Information (30 CFR 550.252 and 30 CR 550.254).....	26
11	Lease Stipulations (30 CFR 550.253)	27
12	Related Facilities and Operations Information (30 CFR 550.256).....	28
13	Support Vessels and Aircraft Information (30 CFR 550.257)	29
14	Onshore Support Facilities Information (30 CFR 550.258)	30
15	Coastal Zone Management Act (CZMA) Information (30 CFR 550.260)	31
16	Environmental Impact Analysis (EIA) (30 CFR 550.261)	31
17	Administrative Information (30 CFR 550.262).....	31
17.1	Exempted information Description	31
17.2	Bibliography	31

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 3 of 39
Uncontrolled when printed or stored locally			

Appendix A:	Plan Information Forms – Form BOEM-0137
Appendix B:	Vicinity Plats, Location Plats and Bathymetry Plats
Appendix D:	Wastes and Discharges Tables (Projected Generated Wastes and Projected Ocean Discharges)
Appendix E:	Air Emissions Information – Form BOEM-0139
Appendix F:	Worst Case Discharge (WCD) Modeling
Appendix G:	Oil Spill Response Discussion
Appendix I:	Environmental Impact Analysis (EIA)

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 4 of 39
Uncontrolled when printed or stored locally			

Plan Contents

1.1 History of Unit Lease

Mississippi Canyon Block 777 Unit, Agreement No. 754398003, originally included Mississippi Canyon Blocks 775, 776, 777, 778, 821, and 822, OCS-G 19997, 9866, 9867, 9868, 14657, and 14658, respectively. Mississippi Canyon Block 821, OCS-G 14657 was contracted out of the unit on June 13, 2013. BP Exploration & Production Inc. holds a 75% working interest in the unit and ExxonMobil owns the remaining 25% interest. BP is designated operator.

The Thunder Horse Area consists of two separate, but related accumulations referred to as Thunder Horse North (THN) and Thunder Horse South (THS). Thunder Horse South (Mississippi Canyon 778 Field) structure is comprised of the south half of Mississippi Canyon Block 778, and all of Mississippi Canyon Blocks 821 and 822. Thunder Horse North (Mississippi Canyon 776 Field) structure includes Mississippi Canyon Blocks 775, 776, 777, and the north half of 778.

The Thunder Horse Semi-Submersible Production, Drilling and Quarters (PDQ) platform was installed on May 11, 2005 over the Thunder Horse South Drill Center (DC) – DC 41 near the southern boundary of MC 778. Production commenced June 14, 2008.

Thunder Horse South includes:

DC 41 (MC 778) – 19 wells

- Two 10-slot manifolds (DC 41-W, DC-41E) with seven wells on production (MC 822 TA001, MC 822 TA003, MC 822 TA006, MC 822 TA007, MC 821 TA008, MC 822 TA010, and MC 778 TA011);
- Three wells Shut-In (MC 822 TA002, MC 778 TA005, MC 822 TA009)
- Four wells permanently abandoned (MC 778 #8, MC 778 #1BP01, MC 822 TA004, and MC 822 #6)
- One well drilled to TD and awaiting sidetrack operations (MC 822 #16)
- Two top holes drilled with plans to deepen to TD in the future (MC 778 #7, MC 778 #13)
- Two previously approved wells yet to be drilled (MC 778 #19 and MC 778 #20).

DC 45 (MC 822) – 4 wells

- One 4-slot manifold with four wells on production (MC 822 TD001, MC 822 TD002, MC 822 TD003, and MC 822 TD004)

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 5 of 39
Uncontrolled when printed or stored locally			

DC 42 (MC 822) - 2 previously approved water injection wells yet to be drilled

DC 46 (MC 822) - 4 wells

- One well on production (MC 822 #TJ001)
- Three previously approved production wells yet to be drilled

DC 47 (MC 822) – 4 wells

- One 4-slot manifold with two wells on production (MC 822-TK001 and MC 822 TK002)
- One well temporarily abandoned (MC 822 #19)
- One well yet to be drilled

Thunder Horse North includes:

DC 30 (MC 775) - 5 wells

- Four wells on production (MC 775 TG001, MC 776 TG002, MC 776 TG003, and MC 775 TG005)
- One well to be permanently abandoned (MC 775 TG004)

DC 31 (MC 776) – 5 wells

- One well drilled and temporarily abandoned (MC 776 #2ST01);
- Four previously approved wells yet to be drilled

DC 32 (MC 776) - 5 wells

- Two wells on production (MC 776 TC002 and MC 777 TC003);
- Two wells permanently abandoned (MC 776 TC001, MC 776 #4 ST01)
- One well yet to be drilled

DC 32Wi (MC 776) – 4 wells

- Two active water injection wells (MC 776 TH001 and MC 776 TH002)
- Two previously approved water injection slots;

DC 33 (MC 777) – 4 wells

- Three wells on production (MC 777 TB001, MC 777 TB003, MC 777 TB004);
- One well abandoned (MC 777 TB002)

DC 33Wi (MC 777) – 2wells

- One active water injection well (MC 777 TI001)
- One well permanently abandoned (MC 777 #7)

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 6 of 39
Uncontrolled when printed or stored locally			

DC 34 (MC 778) – 3 wells

- One well on production (MC 778 TF003);
- One well shut-in (MC 778 TF002)
- One well permanently abandoned (MC 777 TF001)

A list of approved plans is included in the Section 16.2 Bibliography.

A Programmatic Environmental Assessment for Grid 16 - Site-Specific Evaluation of BP Exploration and Production Inc.'s Initial DOCD (N-7469) Thunder Horse Project was issued in December 2002 (OCS EIS/EA MMS 2002-081).

1.2 Description of Activities

This Supplemental DOCD (SDOCD) is to provide for the installation of four new lease term pipelines (2 jumpers, 2 umbilicals) and subsea pump station (SSP station) in Mississippi Canyon Block 778, OCS-G 09868. In addition, we have included OCS Plan Information forms for the following wells approved in Initial DOCD N-7469 to include the drilling and completion of these wells within the approved air emissions through the end of 2032; DC 32 (Well MC 776 AB), DC 33 (MC 777 AA, MC 777 G, MC 777 H) and DC 41 (MC 822 AH, MC 822 K, MC 822 L).

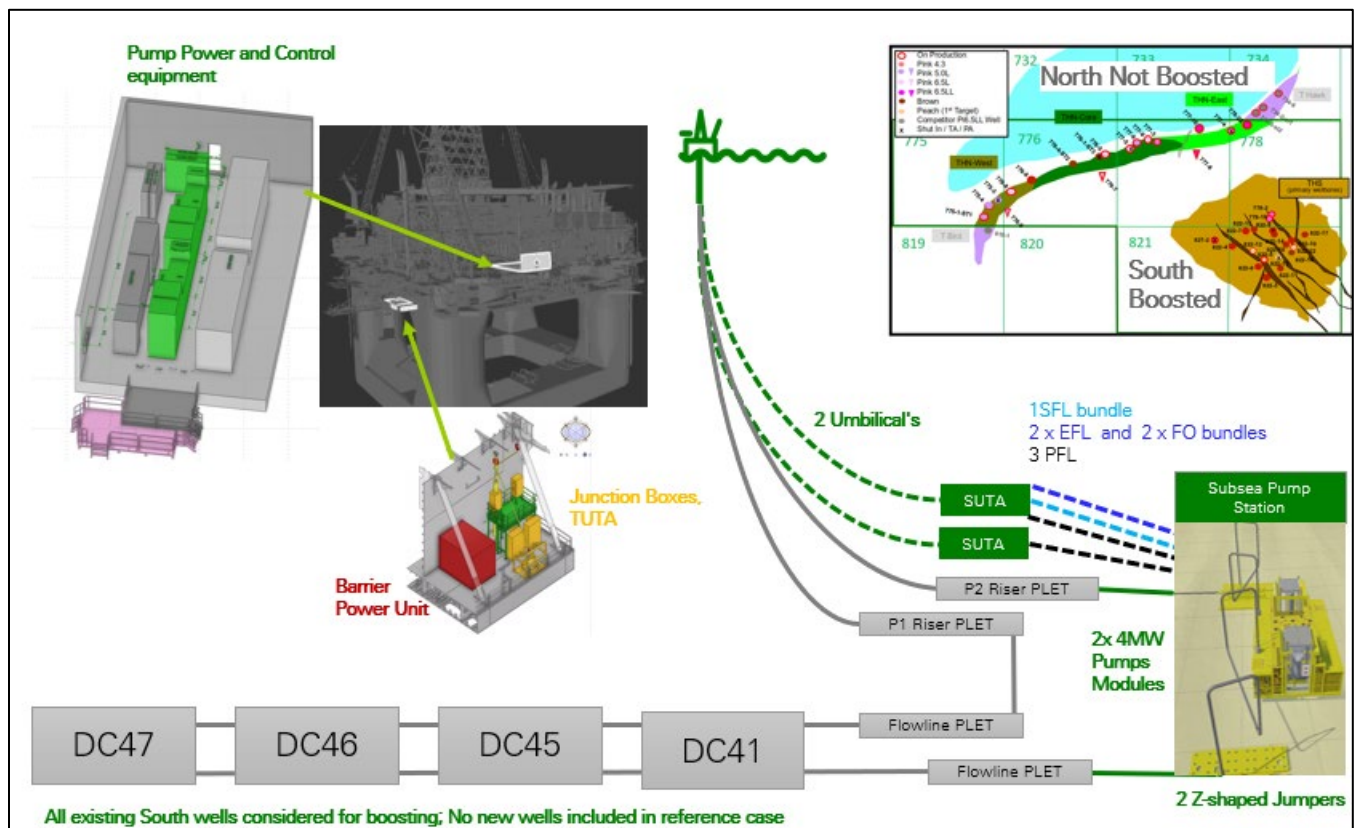
The objective of the subsea pump project is to safely deliver efficient and reliable boosting of production from Thunder Horse South wells to increase ultimate recovery and improve late life operations. The SSP station is designed to generate a differential pressure ranging from 1,800 psi to 2,000 psi within the P2 flowline. No boosting will be applied to the north wells.

The Thunder Horse Subsea Pump Project (TH SSP) project scope includes:

- Subsea scope includes the installation of two 4 MW retrievable subsea pumps and associated equipment for the south wells (P2 riser).
- Topsides equipment brownfield modification to support subsea pumps operation

Figure - TH SSP Scope Overview

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 7 of 39
Uncontrolled when printed or stored locally			



1.3 Location Information

The subsea pump station and associated lease term pipelines will be located in MC 778, OCS-G 09868. Please see [Appendix B](#) for a bathymetry plat and vicinity map.

1.4 Safety and Pollution Prevention Features

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

1.5 Storage Tanks and Production Vessels

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 8 of 39
Uncontrolled when printed or stored locally			

1.6 Additional Measures

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

2 General Information

2.1 Applications and Permits

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

2.2 Drilling Fluids

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

2.3 Anticipated Production Table

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

2.4 Oil Characteristics

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

2.5 Oil Composition

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

2.6 New and Unusual Technology

Development activities in Mississippi Canyon Area Block 778 are not expected to utilize "new or unusual technology" within the meaning of 30 CFR §550.200.

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 9 of 39
Uncontrolled when printed or stored locally			

2.7 Bonding Statement

The bonding requirements for the activities proposed in this DOCD are satisfied by using a third-party guarantee instead of a bond permitted under 30 CFR 556.905, which is furnished and maintained according to 30 CFR Part 556, Subpart I “Bonding or Other Financial Assurance”; NTL No. 2015-N04, “General Financial Assurance” which superseded NTL No. 2000-G16, “Guidelines for General Lease Surety Bonds”; and NTL No. 2016-N01, “Requiring Additional Security” which superseded NTL No.2008-N07 “Supplemental Bond Procedures”.

2.8 Oil Spill Financial Responsibility (OSFR)

BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in the DOCD Plan per 30 CFR Part 553, and NTL No. 2008-N05 “Guidelines for Oil Spill Financial Responsibility for Covered Facilities”.

2.9 Deepwater Well Control Statement

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

2.10 Suspensions of Production

There are no approved suspensions of production in existence, or that BP currently intends to seek, to hold the leases or unit involved with the proposed DOCD activities.

2.11 Blowout Scenario

The worst-case discharge of the wells proposed in this plan based on analysis are not expected to exceed the worst-case discharge of the Blowout Scenario that was described in the Revised DOCD R-6681, which was approved on June 29, 2018.

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 is approximately 360,000 bpd, shown with the calculation support package submitted with RDOCD R-6681. The maximum duration of the blowout is estimated at 121-days. The rate profile associated with the well blowout over this 121-day period results in a potential worst-case spill volume estimated at 27-mmbo. See **Appendix F**.

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 10 of 39
Uncontrolled when printed or stored locally			

2.11.1 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.

2.11.2 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.

2.11.3 The Availability and Timing of a Rig to Drill a Relief Well

The table below lists the Mobile Offshore Drilling Units (MODU) 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 S-DOCD; there is existing infrastructure in the vicinity of the proposed surface locations but none that would impede drilling a relief well.

Rig Name	Current Location	Current Operator	Contract Expire Date	Rated WD (feet)	Rated TD (feet)	Rated BOPs (psi)	Moor Type	Relevant Drill Package Limitations
Diamond Ocean BlackLion	GOM	BP	2024	10K	40K	15K	DP	None identified

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 11 of 39
Uncontrolled when printed or stored locally			

								at this time
West Auriga	GOM	BP	2023	10K	37.5K	15K	DP	None identified at this time

The estimated time to drill a relief well is: 10 days to mobilize and spud, 45 days from spud to casing shoe above WCD zone, plus 35 days for ranging, intersection, and kill operation—for a total of 90 days.

2.11.4 Measures that would Enhance the Ability to Prevent a Blowout

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

- Volume measurements relative to the well will be monitored at all times during all operations;
- Flow checks before leaving bottom, after pulling into shoe, and before BHA enters stack.
- BP representative shall observe well conditions prior to each trip and after well kills or testing;
- BP representative shall be the only person authorized to initiate opening the well as part or conclusion of well control measures;
- On rig JSA/contingency plan before running any non-shearable tools or pipe through the BOP stack;
- BP has a 24/7 monitoring center, Regional Collaboration Center (RCC) (formerly referred to as the '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.

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

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 12 of 39
Uncontrolled when printed or stored locally			

- 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.

2.11.5 Measures that would Reduce the Likelihood of a Blowout

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

1. Minimize any influx events to the wellbore, by using the best pore pressure / frac gradient predictions available, using downhole tools when appropriate, such as PWDs to monitor the wellbore and update pore pressure / frac gradient predictions;
- Management of change process will be followed for all procedure changes; and
- A Well Control Response Guide will be in place.
- With the integration of the Regional Collaboration Center (RCC) (formerly referred to as 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 and Wells Engineer, as well as the rig.

2.11.6 Measures that 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;
- Wellhead equipment and sufficient casing available for a relief well;
- A rig(s) is identified and available for a relief well;
- A Well Control Response Guide is in place; and
- Incident Management System (IMS) is in place.
 - The BP IMS is comprised of government-approved plans which cover various scenarios: Incident Management Teams which are trained annually in the Incident Command System, which is a part of the National Incident Management System; access to response capability through various contractors and technical

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 13 of 39
Uncontrolled when printed or stored locally			

specialists; and predesignated facilities, where the teams can provide adequate oversight to the response.

2.11.7 Other Measures

All proposed activities and facilities in this DOCD will be covered by the GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated October 7, 2024 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on January 10, 2025.

3 Geological and Geophysical Information (30 CFR 550.244)

3.1 Geological description

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

3.2 Structure contour maps

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

3.3 Interpreted Two-Dimensional (2-D) and / or Three-Dimensional (3-D) Seismic Lines

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

3.4 Geological Structure Cross-Sections

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

3.5 Shallow Hazards Report

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 14 of 39
Uncontrolled when printed or stored locally			

3.6 Shallow Hazards Assessment

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

3.7 High-Resolution Seismic Lines

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

4 Hydrogen Sulfide (H₂S) Information (30CFR 550.245)

4.1 Concentration

Anticipated H₂S concentration is 0 ppm. Encountered H₂S is not expected during the operations proposed herein.

4.2 Classification

The Thunder Horse field, Mississippi Canyon 778 Unit Area Blocks 775, 776, 777, 778, 821, and 822 are classified as "H₂S absent" per approved DOCD R-7247, approved on December 15, 2023.

4.3 H₂S Contingency Plan

Based on previous drilling, no H₂S is known to occur in the unit area. Based on earlier drilling and the previous MMS "H₂S absent" classification, a H₂S Contingency Plan prepared per 30 CFR §250.490(f) is not required for the proposed activities.

4.4 Modeling Report

H₂S concentrations greater than 500-parts per million (ppm) are not expected in the operations proposed in this plan, therefore, a modeling report is not required.

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 15 of 39
Uncontrolled when printed or stored locally			

5 Mineral Resource Conservation Information (30 CFR 550.246)

5.1 Technology and Reservoir Engineering Practices and Procedures

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

5.2 Technology and Recovery Practices and Procedures

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

5.3 Reservoir Developments

No updates or changes made to this section when compared to previously approved Supplemental DOCDs for the North and South Fields (S-8090 and S-7998).

6 Biological Information (30 CFR 550.247)

6.1 Benthic Communities Information

6.2 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 benthic communities, including 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. Thunder Horse Pump Project is located in water depths greater than 300-m; therefore, there is the potential for high-density benthic communities to be present. Site Clearance Letter in Appendix C provide a current review of available data confirming the absence of high-density benthic communities within the prescribed distances from the proposed well locations.

6.3 Topographic Features Map

The project area 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 66 statute miles (106 km) from the project

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 16 of 39
Uncontrolled when printed or stored locally			

area. There are no IPFs associated with routine operations that could cause impacts to designated topographic features.

6.4 Topographic Features Statement (Shunting)

Activities proposed under this EP will be conducted outside all Topographic Feature Protective Zones; therefore, shunting of drill cuttings and drilling fluids is not required per NTL No. 2009-G39, “Biologically Sensitive Underwater Features and Areas.”

6.5 Live Bottom (Pinnacle Trend) Information

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 68 statute miles (109 km) from 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.

6.6 Live Bottom (Low Relief) Map

Live Bottom (low relief) Stipulation in NTL No. 2009-G39 does not apply to these leases; therefore, a map is not required.

6.7 Biologically Sensitive Underwater Features and Areas

The proposed activities will be conducted in water depths of approximately 5,722 ft. 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 America 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 BOEM December 2012 Map: “Biologically Sensitive Areas (< 300-m)”.

6.8 Remotely Operated Vehicle (ROV) Monitoring Survey Plan

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

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Pythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 17 of 39
Uncontrolled when printed or stored locally			

6.9 Threatened or Endangered Species, Critical Habitat and Marine Mammal Information

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 America). 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. NMFS has jurisdiction for ESA listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of America. The USFWS has jurisdiction for ESA listed birds, the West Indian manatee, and sea turtles while on their nesting beaches.

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 America
			Project Area	Coastal	
Marine Mammals					
Rice's whale	<i>Balaenoptera riceii</i>	E	X	--	None
Sperm whale	<i>Physeter macrocephalus</i>	E	X	--	None
West Indian manatee	<i>Trichechus manatus</i> ^a	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	<i>Caretta caretta</i>	T,E ^b	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); <i>Sargassum</i> habitat including most of the central & western Gulf of America
Green turtle	<i>Chelonia mydas</i>	T	X	X	None
Leatherback turtle	<i>Dermochelys coriacea</i>	E	X	X	None
Hawksbill turtle	<i>Eretmochelys imbricata</i>	E	X	X	None
Kemp's ridley turtle	<i>Lepidochelys kempii</i>	E	X	X	None
Birds					
Piping Plover	<i>Charadrius melodus</i>	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	<i>Grus americana</i>	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Black-capped Petrel	<i>Pterodroma hasitata</i>	E	X	--	None
Rufa Red Knot	<i>Calidris canutus rufa</i>	T	--	X	None
Fishes					
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	T	X	--	None
Title of Document:	Thunder Horse Supplemental DOCD		Document Number:		
Authority:	Kevin Stanley		Revision		0
Custodian/Owner:	Amanda Phythian		Issue Date:		
Retention Code:	ADM3000		Next Review Date (if applicable):		n/ a
Security Classification:	BP Internal		Page:		Page 18 of 39
Uncontrolled when printed or stored locally					

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of America
			Project Area	Coastal	
Giant manta ray	<i>Mobula birostris</i>	T	X	X	None
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	<i>Epinephelus striatus</i>	T	--	X	Florida Keys, Puerto Rico, U.S. Virgin Islands
Smalltooth sawfish	<i>Pristis pectinata</i>	E	--	X	Southwest Florida
Invertebrates					
Elkhorn coral	<i>Acropora palmata</i>	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	<i>Acropora cervicornis</i>	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	<i>Dendrogyra cylindrus</i>	E	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Rough cactus coral	<i>Mycetophyllia ferox</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Lobed star coral	<i>Orbicella annularis</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Mountainous star coral	<i>Orbicella faveolata</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Boulder star coral	<i>Orbicella franksi</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Panama City crayfish	<i>Procambarus econfinae</i>	T	--	X	South-central Bay County, Florida
Queen conch	<i>Aliger gigas</i>	T	--	X	None
Terrestrial Mammals					
Beach mouse (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	<i>Peromyscus polionotus</i>	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	<i>Microtus pennsylvanicus dukecampbelli</i>	E	--	X	None

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

^aThere are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of America 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 America. On 30 March 2017, the USFWS announced the West Indian manatee, including the Florida manatee subspecies, was reclassified as Threatened.

^bThe 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).

Title of Document:	Thunder Horse Supplemental DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 19 of 39
Uncontrolled when printed or stored locally			

Coastal Endangered or Threatened species that may occur along the northern Gulf Coast include the West Indian manatee, Piping Plover (*Charadrius melodus*), Rufa Red Knot (*Calidris canutus rufa*), Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*), Panama City crayfish (*Procambarus econfinae*), Whooping Crane (*Grus americana*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), smalltooth sawfish (*Pristis pectinata*), queen conch (*Aliger gigas*) and four subspecies of beach mouse. Critical habitat has been designated for all of these species (except the Florida salt marsh vole, Rufa Red Knot, and queen conch) as indicated in Table 7 (EIA) and discussed in individual sections.

The sperm whale (*Physeter macrocephalus*), the Rice's whale (*Balaenoptera ricei*), five species of sea turtles, the oceanic whitetip shark (*Carcharhinus longimanus*), giant manta ray (*Mobula birostris*), and the Black-capped Petrel (*Pterodroma hasitata*) are the only Endangered or Threatened species likely to occur in or near the project area. The listed sea turtles include the leatherback turtle (*Dermochelys coriacea*), Kemp's ridley turtle (*Lepidochelys kempii*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and green turtle (*Chelonia mydas*) (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.3.5). No critical habitat has been designated in the Gulf of America for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, or the sperm whale. Five Endangered mysticetes (blue whale [*Balaenoptera musculus*], fin whale [*B. physalus*], humpback whale [*Megaptera novaeangliae*], North Atlantic right whale [*Eubalaena glacialis*], and sei whale [*B. borealis*]) have been reported in the Gulf of America, but are considered rare or extralimital (Würsig et al., 2000; Hayes et al., 2024). There is no Northern Gulf of America stock designated by NMFS for these species, and the most recent NMFS stock assessment reports (Hayes et al., 2020, 2022, 2024) do not list their ranges as including the Gulf of America. They are also not included in the most recent BOEM multisale EIS (BOEM, 2017a); therefore, they are not considered further in the EIA.

The Rice's whale (*B. ricei*) exists in the Gulf of America as a small, resident population. This species was formally known as a subspecies to the Bryde's whale (*B. edeni brydei*) until recent DNA studies identified it as a separate species (Rosel et al., 2021). It is the only baleen whale known to be a resident in the Gulf of America. The species is severely restricted in range, being found only in the northeastern Gulf in the waters of the DeSoto Canyon (Waring et al., 2016; Rosel et al., 2021). However, recent work by Soldevilla et al. (2022) suggests the range may be broader than previously thought (see Section C.3.2, EIA). The giant manta

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 20 of 39
Uncontrolled when printed or stored locally			

ray could occur in the project area but is most commonly observed in the Gulf of America at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of America at the Flower Garden Banks but is most commonly observed in shallow tropical reefs of the Caribbean and is not expected to occur in the project area. The smalltooth sawfish is a coastal species limited to shallow areas off the west coast of Florida and is not expected to occur in the project area.

There is only one Endangered coral species, the pillar coral (*Dendrogyra cylindrus*), while six Threatened coral species are known from the northern Gulf of America: elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicornis*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), and rough cactus coral (*Mycetophyllia ferox*). None of these species are expected to be present in the project area (Section C.3.18, EIA).

There are no other Threatened or Endangered species in the Gulf of America that are reasonably likely to be adversely affected by either routine or accidental events.

6.10 Archaeological Report

With the water depth at the location of the proposed boosting station being approximately 6,037 ft (1,840 m) (bp, 2001), which are 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 America. 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.

7 Wastes and Discharges Information (30 CFR 550.248)

Please see **Appendix D** for copies of the Wastes and Discharges tables.

8 Air Emissions (30 CFR 550.249)

Air emissions for the proposed operations are covered in the existing complex AQR approved in RDOCD R-7247, approved on December 15, 2023. Air emissions information including Screening Questions, Plan and Complex Total Emissions Worksheets, Emission Reduction Measures, Verification of Non-Default Emission Factors, Non-Exempt Activities, Modeling and Modeling Report, and Actual Fuel Usage Records can be found in **Appendix E**.

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 21 of 39
Uncontrolled when printed or stored locally			

8.1 Emissions Screening Questions

Screening Questions for DOCD'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	
Does or will the facility complex associated with your proposed development and production activities process production from eight or more wells?	X	
Do you expect to encounter H ₂ S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas in excess of the criteria set forth under 30 CFR 250.1105(a)(2) and (3)?		X
Do you propose to burn produced hydrocarbon liquids?		X
Are your proposed development and production activities located within 25 miles (40 kilometers) from shore?		X
Are your proposed development and production activities located within 124 miles (200 kilometers) of the Breton Wilderness Area?	X	

9 Oil Spill Information (30 CFR 550.250)

9.1 Regional Oil Spill Response Plan (OSRP) Information

All proposed activities and facilities in this DOCD will be covered by the GoA Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated October 7, 2024, on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on January 10, 2025.

BP has adopted additional performance standards:

- 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;
- 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;

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 22 of 39
Uncontrolled when printed or stored locally			

- 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.

Spill Response Sites

Primary Response Equipment Location	Preplanned Staging Location(s)
Tampa, FL; Pascagoula, MS; Houma, LA.; Leeville, LA; Morgan City, LA; Lake Charles, LA.; Venice, LA; Galveston, TX; Ingleside, TX.	Fourchon, LA.

9.1.1 OSRO

BP is a member of the Marine Spill Response Corporation (MSRC) and Clean Gulf Associates (CGA) and would utilize said Oil Spill Response Organization (OSRO) personnel and equipment in the event of an oil spill at Mississippi Canyon Area Blocks 775, 776, 777, 778 and 822.

9.1.2 Worst-case scenario determination

Category	Regional OSRP Approved October 22, 2021 (RDOCD 6681 MC 776, MC 777, MC 778, MC 822)	Regional OSRP Approved October 22, 2021 Production	Plan Activities
Type of Activity	Drilling >10 miles	Production > 10 miles	Production > 10 miles
Facility Location	MC 778	MC 822	MC 778

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 23 of 39
Uncontrolled when printed or stored locally			

Facility Designation	Thunder Horse Well 778-15	Thunder Horse PDQ	Thunder Horse Subsea Pump
Distance to Nearest Shoreline	68-miles	68-miles	68-miles
Volume storage tanks and flowline (total)	50,000-bbls	50,000-bbls	0
Volume Lease term pipelines	13,000-bbls	13,000-bbls	18,100 bbls
Daily Production Volume	0	55,000 bbls	0
Volume Uncontrolled Blowout (Day 1)	360,000-bbls	0 bbls	18,100 bbls
Total Volume	423,000-bbls	118,000 bbls	18,100 bbls
Type of Oil(s) – (Crude Oil, Condensate, Diesel)	Crude	Crude	Crude
API Gravity(s)	32.0°	33.0°	32.0°

*Note: Worst-case discharge scenario associated with activities covered by this SDOCD do not exceed the worst-case discharge scenario described in DOCD R-06681 or the worst-case discharge scenario covered by BPXP's approved OSRP

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) under cover letter dated October 7, 2024, on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on January 10, 2025. 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 January 10, 2025, and since the worst-case scenario determined for our SDOCD 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 SDOCD.

9.2 Oil spill response discussion

A detailed discussion of a response to an oil spill at Mississippi Canyon Area is included in [Appendix G: Oil Spill Response Discussion](#). This Appendix addressed topics such as oil spill release modeling, environmental and socioeconomic resources that could potentially be impacted, response technologies, and source containment/control.

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 24 of 39
Uncontrolled when printed or stored locally			

10 Environmental Monitoring and Environmental Mitigation Measures Information (30 CFR 550.252 and 30 CR 550.254)

10.1 Monitoring Systems

In addition to rig control engineered systems, operational personnel have been instructed to check for pollution frequently during their tour of duty and, if 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 measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended on April 26, 2021 [Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce (March 13, 2020, amended April 26, 2021)], a person onboard the vessel(s) will visually monitor the moonpool(s) using a remote camera system. Logs will be kept for each shift documenting the observed presence/absence of marine animals in the moonpool(s). If a protected species is observed in the moonpool(s), required reporting to the appropriate agencies will be made and BP will comply with ensuing guidance.

Also, in accordance with the provisions of Title 30 CFR § 250.713(g) and NTL 2018-G01 "Ocean Current Monitoring" dated August 7, 2018, 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.

10.2 Incidental Takes

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. 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". Additionally, to mitigate against incidental takes, activities will be conducted in adherence to 2020 revisions of 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

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 25 of 39
Uncontrolled when printed or stored locally			

"Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program", as necessary. 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 America (GoA) Environmental Training Matrix" and "BP's GoA Health, Safety, and Environmental (HSE) Training Needs Assessment", both of which are located on BP's GoA HSE website. Further mitigation measures can be found throughout the supporting EIA found in **Appendix I**.

10.3 Flower Garden Banks National Marine Sanctuary

All proposed activities will occur outside of the Protective Zones of the Flower Garden Banks National Marine Sanctuary boundaries.

11. Lease Stipulations (30 CFR 550.253)

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

11.1 Lease Stipulation Information

Lease Stipulation for Protected Species

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Additionally, all activities will be conducted in adherence to 2020 revisions of 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 necessary. 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.

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 26 of 39
Uncontrolled when printed or stored locally			

12 Related Facilities and Operations Information (30 CFR 550.256)

12.1 Related OCS facilities and Operations

Thunder Horse PDQ is located in Mississippi Canyon 778. This project will utilize existing structure and facilities. Thunder Horse production will be transported from the platform by the existing export pipeline system described in Section 12.2. Other than project facilities and operations described in this plan, there are no other existing drilling units, production platforms, pipeline accessory platforms, host facilities, pipelines and associated umbilicals, or other facilities and operations located on the OCS that directly relate to the proposed development activities.

Additional subsea infrastructure will be added as part of this development. The planned subsea sleds and associated pipelines will be addressed in a separate pipeline permit application. The operations are not located within the Protective Zones of the State of Florida, Flower Garden Banks or Stetson Bank.

12.2 Transportation Systems

The liquid hydrocarbons from the Thunder Horse PDQ are currently transported to shore via two existing pipelines, Segment No. 13632, Okeanos Gas Pipeline, and Segment No. 13633, Proteus Oil Pipeline. The Okeanos Gas Pipeline extends from Mississippi Canyon Block 778 to Main Pass Block 260 where it interconnects with the Destin Pipeline. The Destin Pipeline extends from Viosca Knoll Block 900 to Main Pass Block 260 then north to a processing plant operated by Enterprise at Pascagoula, Mississippi. Regarding oil production, two segments of the Mardi Gras Transportation System transport oil production from the Thunder Horse field to market. Proteus Oil Pipeline, the 28-inch deepwater portion of the system, extends 70 miles from the Thunder Horse platform to a booster station platform installed on South Pass Block 89. From there, Proteus connects to Endymion Oil Pipeline, a 90 mile, 30-inch system extending to Clovelly, LA, where it connects with the Louisiana Offshore Oil Port (LOOP) storage and offloading facilities. No new refineries, gas plants or compressor stations will be built for this project.

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 27 of 39
Uncontrolled when printed or stored locally			

13 Support Vessels and Aircraft Information (30 CFR 550.257)

13.1 Support Vessel and Aircraft Information Table

Type	Maximum Fuel Tank Storage Capacity	Maximum No. in Area at Any Time	Trip Frequency or Duration
Helicopter-Sikorsky S-92	760-gallons	1	7 / week
Crew Boat	1,000-bbls	1	2 / week
Supply Boat	5,000-bbls	1	4 / week

13.2 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-ft to 312-ft	50,000 -bbls (boat fuel) 150-K to 250-K gallons of transferrable fuel (rig fuel)	Weekly / as needed	From the shorebase in Fourchon, LA, to Mississippi Canyon Block 778

13.3 Solid and liquid wastes transportation

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 **Appendix D**.

13.4 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**.

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 28 of 39
Uncontrolled when printed or stored locally			

14 Onshore Support Facilities Information (30 CFR 550.258)

14.1 Onshore Support Facilities Information

The onshore support base for the proposed operations will be in Fourchon, Louisiana. MC 778 is located approximately 105 miles from the Fourchon shorebase, 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	Port Fourchon, LA	Existing
Houma-Terrebonne Airport-PHI base	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 104 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 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.

14.2 Support Base Construction or Expansion

BP will utilize existing support bases for these development activities in Mississippi Canyon Area Block 777 and therefore will not require the construction or expansion of additional support bases.

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 29 of 39
Uncontrolled when printed or stored locally			

15 Coastal Zone Management Act (CZMA) Information (30 CFR 550.260)

15.1 Consistency Certification

This SDOCD does not include a new multi-well structure so no new CZM is required.

16 Environmental Impact Analysis (EIA) (30 CFR 550.261)

Please see **Appendix I** for a copy of the Environmental Impact Assessment.

17 Administrative Information (30 CFR 550.262)

17.1 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

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

17.2 Bibliography

- Initial POE N-06604 approved December 1, 1999
- Revised POE R-3409 approved March 21, 2000
- Initial DOCD N-07469 approved March 12, 2003
- Revised DOCD R-04175 on June 10, 2005
- Revised EP R-4318 approved July 11, 2006
- Supplemental EP S-6966 approved October 26, 2006
- Revised DOCD R-04665 on June 19, 2007
- Revised DOCD R-04701 on August 20, 2007
- Revised DOCD R-04710 on October 25, 2007
- Revised DOCD R-04818 on May 9, 2008

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 30 of 39
Uncontrolled when printed or stored locally			

- Revised DOCD R-04822 on June 30, 2008
- Revised DOCD R-04885 on February 11, 2009
- Supplemental DOCD S-7263 approved February 26, 2009
- Revised DOCD R-4509 approved May 6, 2009
- Revised DOCD R-04929 on June 15, 2009
- Supplemental DOCD S-7525 approved May 29, 2012 (Water Injection)
- Revised DOCD R-5494 approved September 12, 2012 (Worst Case Discharge)
- Revised DOCD R-5645 approved November 7, 2012 (Revised Rig Type)
- Revised DOCD R-5771 approved January 8, 2015 (activities for MC 822 #5)
- Revised DOCD R-5759 approved February 1, 2013 (Flotel and revised AQR)
- Revised DOCD R-5798 approved July 16, 2013 (revised location AI, MC 778 #18)
- Revised DOCD R-5942 approved October 4, 2013 (AQR for Thunder Horse Field)
- Revised DOCD R-5970 approved May 30, 2014 (revised locations AM and B)
- Revised DOCD R-6338 approved August 27, 2015 (revised rig type for 777#2)
- Revised DOCD R-6424 approved April 15, 2016 (revised rig type for 777#2)
- Supplemental DOCD S-7706 approved June 12, 2015 (South Expansion)
- Supplemental DOCD S-7799 approved June 30, 2016 (South Expansion additional locations)
- Revised DOCD R-6585 approved June 23, 2017 (revised bottomhole location 778#17)
- Supplemental DOCD S-7868 approved March 9, 2018 (Northwest Expansion)
- Revised DOCD R-6681 approved June 29, 2018 (WCD increase – Well 822#16)
- Revised DOCD R-6853 approved September 27, 2019 (Revised BHL – Well 778#16)
- Revised DOCD R-6828 approved June 7, 2019 (Revised Water Injection Wells Drill Schedule)
- Revised DOCD R-6818 approved January 17, 2020 (Revised Field Wide AQR)
- Supplemental DOCD S-07998 approved July 31, 2020 (South Expansion 2 Project)
- Supplemental DOCD S-8090 approved October 27, 2022 (Addition of North well)

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 31 of 39
Uncontrolled when printed or stored locally			

-
- Revised DOCD R-7247 approved December 15, 2023 (Field Wide AQR and "H2S absent" classification)

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 32 of 39
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Appendix A: Plan Information Forms – Form BOEM-0137

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 33 of 39
Uncontrolled when printed or stored locally			

OCS PLAN INFORMATION FORM

General Information

Type of OCS Plan:	☐ Exploration Plan (EP)	☒ Development Operations Coordination Document (DOCD)	X
Company Name: BP Exploration & Production, Inc.		BOEM Operator Number: 02481	
Address:		Contact Person: Amanda Phythian	
501 Westlake Park Blvd		Phone Number: 713-540-4076	
Houston, TX 77079		E-Mail Address: amanda.phythian@bp.com	
If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid	N/A	Receipt No. N/A

Project and Worst Case Discharge (WCD) Information

Lease(s): OCS-G 09867/ OCS-G 14658	Area: MC	Block(s): 822	Project Name (If Applicable): Thunder Horse		
Objective(s)	☒ Oil	☒ Gas	☐ Sulphur	☐ Salt	Onshore Support Base(s): Fourchon, LA
Platform/Well Name: MC822-16	Total Volume of WCD: 360,000 bbls			API Gravity: 32	
Distance to Closest Land (Miles): 68		Volume from uncontrolled blowout: N/A			
Have you previously provided information to verify the calculations and assumptions for your WCD?				☒ Yes	☐ No
If so, provide the Control Number of the EP or DOCD with which this information was provided				R-6681	
Do you propose to use new or unusual technology to conduct your activities?				☐ Yes	☒ No
Do you propose to use a vessel with anchors to install or modify a structure?				☐ Yes	☒ No
Do you propose any facility that will serve as a host facility for deepwater subsea development?				☐ Yes	☒ No

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

Proposed Activity	Start Date	End Date	No. of Days
Exploration drilling			
Development drilling			
Well completion			
Well test flaring (for more than 48 hours)			
Installation of Lease Term Umbilicals	1/8/2028	4/6/2028	90
Installation of Pile and Subsea Pump	3/11/2028	6/8/2028	90
Installation of Lease Term Jumpers	7/9/2028	7/22/2028	14
Installation of lease term pipelines			
Commence production			
Other (Specify and attach description)			

Description of Drilling Rig

Description of Structure

☐	Jackup	☒	Drillship	☐	Caisson	☐	Tension leg platform
☐	Gorilla Jackup	☒	Platform rig	☐	Fixed platform	☐	Compliant tower
☐	Semisubmersible	☐	Submersible	☐	Spar	☐	Guyed tower
☒	DP Semisubmersible	☐	Other (Attach Description)	X	Floating production system	☐	Other (Attach Description)
Drilling Rig Name (If Known):							

Description of Lease Term Pipelines

From (Facility/Area/Block)	To (Facility/Area/Block)	Diameter (Inches)	Length (Feet)
P2 flowline out & back PLET	Pump station manifold hold	12.75	125
Pump station manifold hub	P2 Riser PLET	12.75	125
U9 Umbilical from TH PDQ	SUTA at P2 flowline out & back	6.61	19,357
U10 Umbilical from TH PDQ	SUTA at P2 flowline out & back	6.61	19,357

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): MC 778 A (Thunder Horse)				Previously reviewed under an approved EP or DOCD?		☒	Yes	☐	No
Is this an existing well or structure?	☒	Yes	☐	No	If this is an existing well or structure, list the Complex ID or API No.		Complex ID 1101		
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						☐	Yes	☒	No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 360,000 bbls			For structures, volume of all storage and pipelines (Bbls): 118,000			API Gravity of fluid		33°
	Surface Location			Bottom-Hole Location (For Wells)			Completion (For multiple completions, enter separate lines)		
Lease No.	OCS G09868			OCS			OCS OCS		
Area Name	MC								
Block No.	778								
Blockline Departures (in feet)	N/S Departure: 444 F__S__L			N/S Departure: F____L			N/S Departure: F____L N/S Departure: F____L N/S Departure: F____L		
	E/W Departure: 2463 F__W__L			E/W Departure: F____L			E/W Departure: F____L E/W Departure: F____L E/W Departure: F____L		
Lambert X-Y coordinates	X: 1,158,783			X:			X: X: X:		
	Y: 10,233,084			Y:			Y: Y: Y:		
Latitude/ Longitude	Latitude 28° 11' 26.1918"			Latitude			Latitude Latitude Latitude		
	Longitude -88° 29' 44.1018"			Longitude			Longitude Longitude Longitude		
Water Depth (Feet): 6,200'				MD (Feet):		TVD (Feet):		MD (Feet): MD (Feet): MD (Feet):	
Anchor Radius (if applicable) in feet:								TVD (Feet): TVD (Feet): TVD (Feet):	
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): MC 776, Well AB (N-7469, DC 32)					Previously reviewed under an approved EP or DOCD?		☒	☐	☐	☐
Is this an existing well or structure?		☐	☐	☒	☐	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?							☒	☐	☐	☐
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 360,000 bbls				For structures, volume of all storage and pipelines (Bbls): 118,000			API Gravity of fluid		33°
	Surface Location				Bottom-Hole Location (For Wells)			Completion (For multiple completions, enter separate lines)		
Lease No.	OCS G09866				OCS G09866			OCS G09866		
Area Name	MC				MC			MC		
Block No.	776				776			776		
Blockline Departures (in feet)	N/S Departure: 5,779 F__N__L				N/S Departure: F__L			N/S Departure: F__L		
	E/W Departure: 1,790 F__E__L				E/W Departure: F L			E/W Departure: F__L		
Lambert X-Y coordinates	X: 1,138,690				X:			X:		
	Y: 10,242,701				Y:			Y:		
Latitude/ Longitude	Latitude 28° 12' 58.917"				Latitude			Latitude		
	Longitude -88° 33' 30.038"				Longitude			Longitude		
Water Depth (Feet): 5,400'				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
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): MC 777, Well AA (N-7469, DC 33)					Previously reviewed under an approved EP or DOCD?		☒	☐	☐	☐
Is this an existing well or structure?		☐	☐	☒	☐	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?							☒	☐	☐	☐
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 360,000 bbls				For structures, volume of all storage and pipelines (Bbls): 118,000			API Gravity of fluid		33°
	Surface Location				Bottom-Hole Location (For Wells)			Completion (For multiple completions, enter separate lines)		
Lease No.	OCS G09867				OCS G09867			OCS G09867		
Area Name	MC				MC			MC		
Block No.	777				777			777		
Blockline Departures (in feet)	N/S Departure: 4120 F__N__L				N/S Departure: F__L			N/S Departure: F__L		
	E/W Departure: 6561 F__W__L				E/W Departure: F__L			E/W Departure: F__L		
Lambert X-Y coordinates	X: 1,147,041				X:			X:		
	Y: 10,244,360				Y:			Y:		
Latitude/ Longitude	Latitude 28° 13' 16.399"				Latitude			Latitude		
	Longitude -88° 31' 56.923"				Longitude			Longitude		
Water Depth (Feet): 5,400'					MD (Feet):		TVD (Feet):		MD (Feet):	
Anchor Radius (if applicable) in feet:									TVD (Feet):	
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 =					

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) MC 777, Well G (N-7469, DC 33)				Previously reviewed under an approved EP or DOCD?		☒	☐	☐	☐
Is this an existing well or structure?		☐	☐	☒	☐	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?						☒	☐	☐	☐
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 360,000 bbls				For structures, volume of all storage and pipelines (Bbls): 118,000		API Gravity of fluid		33°
	Surface Location			Bottom-Hole Location (For Wells)			Completion (For multiple completions, enter separate lines)		
Lease No.	OCS G09867			OCS G09867			OCS G09867		
Area Name	MC			MC			MC		
Block No.	777			777			777		
Blockline Departures (in feet)	N/S Departure: 4,080 F__N__L			N/S Departure: F__L			N/S Departure: F__L		
	E/W Departure: 6,601 F__W__L			E/W Departure: F__L			E/W Departure: F__L		
Lambert X-Y coordinates	X: 1,147,081			X:			X:		
	Y: 10,244,400			Y:			Y:		
Latitude/ Longitude	Latitude 28° 13' 16.800"			Latitude			Latitude		
	Longitude -88° 31' 56.482"			Longitude			Longitude		
Water Depth (Feet): 5,400'				MD (Feet):		TVD (Feet):		MD (Feet):	
Anchor Radius (if applicable) in feet:								TVD (Feet):	
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 =					

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): MC 777, Well H (N-7469, DC 33)				Previously reviewed under an approved EP or DOCD?		☒	Yes	☐	No
Is this an existing well or structure?		☐	Yes	☒	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?						☒	Yes	☐	No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 360,000 bbls				For structures, volume of all storage and pipelines (Bbls): 118,000		API Gravity of fluid		33°
	Surface Location				Bottom-Hole Location (For Wells)		Completion (For multiple completions, enter separate lines)		
Lease No.	OCS G09867				OCS G09867		OCS G09867		
Area Name	MC				MC		MC		
Block No.	777				777		777		
Blockline Departures (in feet)	N/S Departure: 4160 F__N__L				N/S Departure: F__L		N/S Departure: F__L		
	E/W Departure: 6521 F__W__L				E/W Departure: F L		E/W Departure: F__L		
Lambert X-Y coordinates	X: 1,147,001				X:		X:		
	Y: 10,244,320				Y:		Y:		
Latitude/ Longitude	Latitude 28° 13' 15.998"				Latitude		Latitude		
	Longitude -88° 31' 57.365"				Longitude		Longitude		
Water Depth (Feet): 5,400'				MD (Feet):		TVD (Feet):		MD (Feet):	
Anchor Radius (if applicable) in feet:								TVD (Feet):	
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 =				

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) MC 822, Well AH (N-7469, DC 41)				Previously reviewed under an approved EP or DOCD?		☒	☐	☐	☐
Is this an existing well or structure?		☐	☐	☒	☐	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?						☒	☐	☐	☐
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 360,000 bbls				For structures, volume of all storage and pipelines (Bbls): 118,000		API Gravity of fluid		33°
	Surface Location			Bottom-Hole Location (For Wells)			Completion (For multiple completions, enter separate lines)		
Lease No.	OCS G09868			OCS G14658			OCS G14658		
Area Name	MC			MC			MC		
Block No.	778			822			822		
Blockline Departures (in feet)	N/S Departure: 542' F__S__L			N/S Departure: F__L			N/S Departure: F__L		
	E/W Departure: 2,530' F__W__L			E/W Departure: F__L			E/W Departure: F__L		
Lambert X-Y coordinates	X: 1,158,850			X:			X:		
	Y: 10,233,182			Y:			Y:		
Latitude/ Longitude	Latitude 28° 11' 27.172"			Latitude			Latitude		
	Longitude -88° 29' 43.370"			Longitude			Longitude		
Water Depth (Feet): 6,000'				MD (Feet):		TVD (Feet):		MD (Feet):	
Anchor Radius (if applicable) in feet:								TVD (Feet):	
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

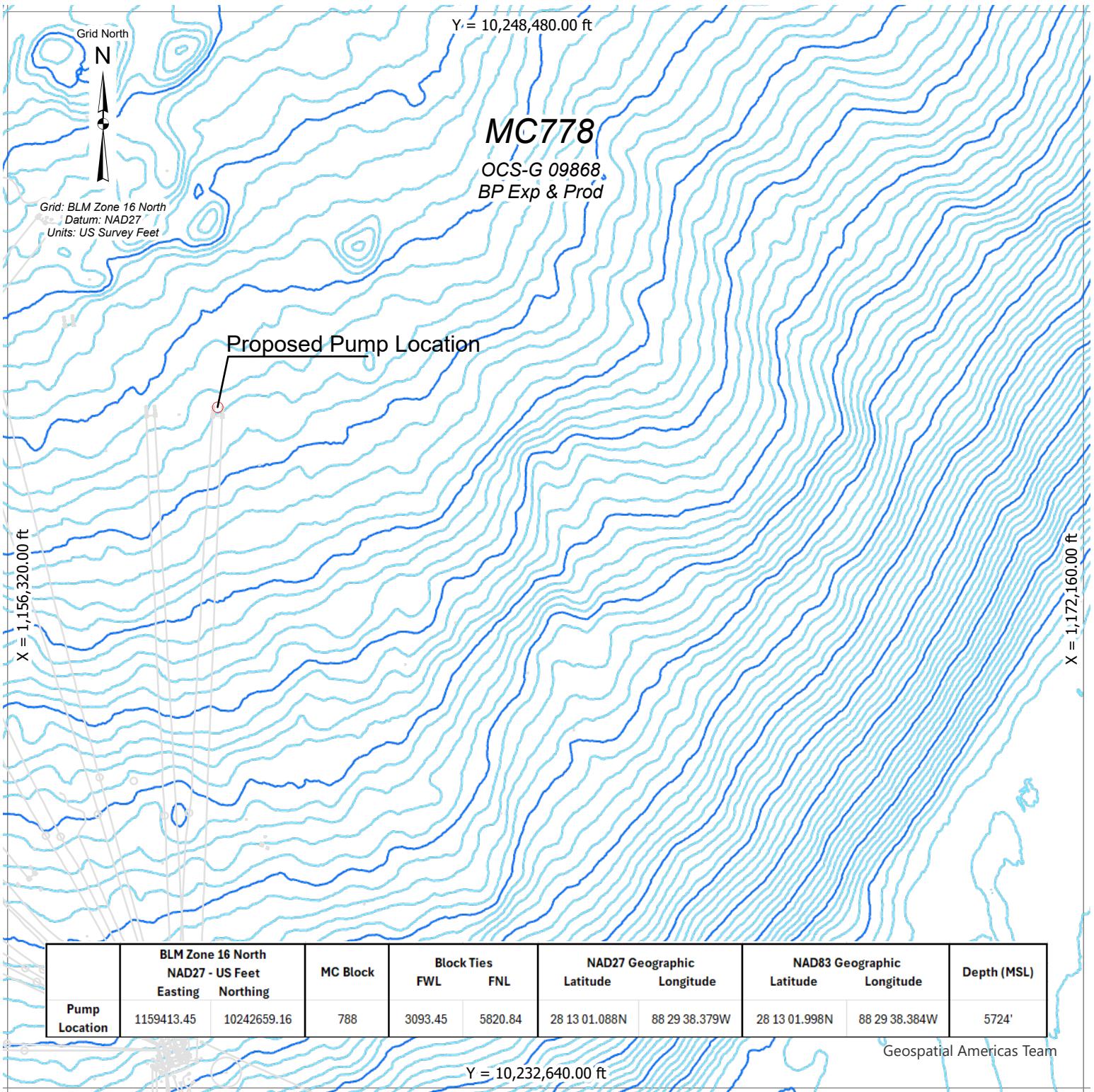
Proposed Well/Structure Location									
Well or Structure Name/Number (If renaming well or structure, reference previous name): MC 822, Well K (N-7469, DC 41)				Previously reviewed under an approved EP or DOCD?		☒	☐	☐	☐
Is this an existing well or structure?		☐	☐	☒	☐	If this is an existing well or 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?						☒	☐	☐	☐
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 360,000 bbls				For structures, volume of all storage and pipelines (Bbls): 118,000		API Gravity of fluid		33°
	Surface Location				Bottom-Hole Location (For Wells)		Completion (For multiple completions, enter separate lines)		
Lease No.	OCS G09868				OCS G14658		OCS G14658		
Area Name	MC				MC		MC		
Block No.	778				822		822		
Blockline Departures (in feet)	N/S Departure: 330' F__S__L				N/S Departure: F__L		N/S Departure: F__L		
	E/W Departure: 2,439' F__W__L				E/W Departure: F__L		E/W Departure: F__L		
Lambert X-Y coordinates	X: 1,158,759				X:		X:		
	Y: 10,232,970				Y:		Y:		
Latitude/ Longitude	Latitude 28° 11' 25.061"				Latitude		Latitude		
	Longitude -88° 29' 44.355"				Longitude		Longitude		
Water Depth (Feet): 6,000'				MD (Feet):		TVD (Feet):		MD (Feet):	
Anchor Radius (if applicable) in feet:								TVD (Feet):	
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): MC 822, Well L (N-7469, DC 41)					Previously reviewed under an approved EP or DOCD?		☒	☐	☐	☐
Is this an existing well or structure?		☐	☐	☒	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?							☒	☐	☐	☐
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 360,000 bbls				For structures, volume of all storage and pipelines (Bbls): 118,000			API Gravity of fluid		33°
	Surface Location				Bottom-Hole Location (For Wells)			Completion (For multiple completions, enter separate lines)		
Lease No.	OCS G09868				OCS G14658			OCS G14658		
Area Name	MC				MC			MC		
Block No.	778				822			822		
Blockline Departures (in feet)	N/S Departure: 395' F__S__L				N/S Departure: F__L			N/S Departure: F__L		
	E/W Departure: 2531' F__W__L				E/W Departure: F__L			E/W Departure: F__L		
Lambert X-Y coordinates	X: 1,158,851				X:			X:		
	Y: 10,233,036				Y:			Y:		
Latitude/ Longitude	Latitude 28° 11' 25.723"				Latitude			Latitude		
	Longitude -88° 29' 43.339"				Longitude			Longitude		
Water Depth (Feet): 6,000'					MD (Feet):		TVD (Feet):		MD (Feet):	
Anchor Radius (if applicable) in feet:									TVD (Feet):	
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 =					

Appendix B: Bathymetry Plat and Vicinity Map

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 34 of 39
Uncontrolled when printed or stored locally			



Notes:

- 1) All spatial data based on BLM Zone 16 North, NAD27, US Survey Feet, unless otherwise noted;
- 2) All geodetic transformations based on NADCON version 2.0 or better software;
- 3) All well SHL and BHL data based upon BSEE data as of February 2026 and internal BP sources;

"Bathymetry"



BP EXPLORATION AND PRODUCTION

Scale 1" = 2000 ft

Proposed Pump Location OCS-G09868 MC778

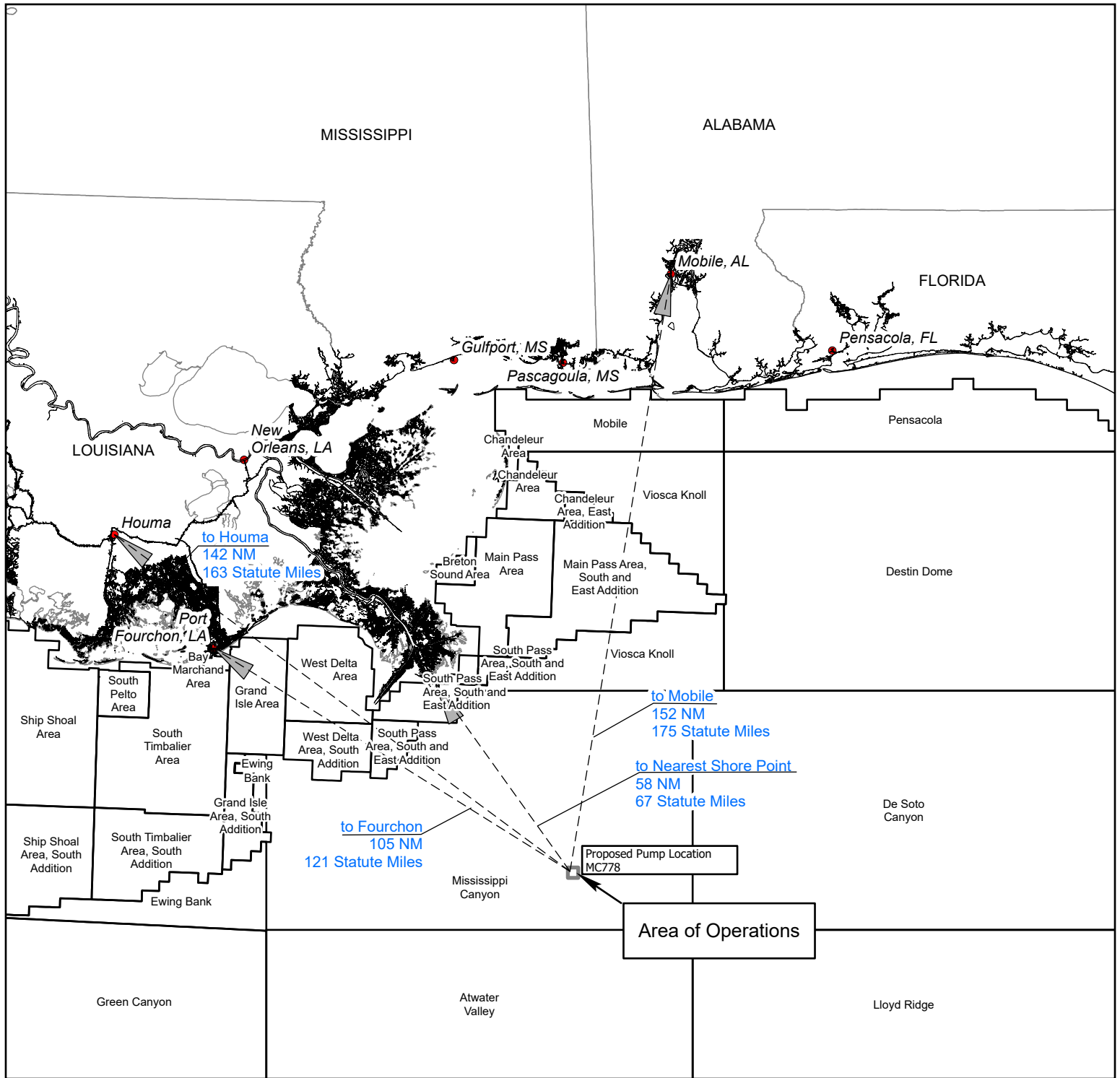
Date: 2/5/2026

Mississippi Canyon Area (OPD# NH16-10) Block 778

Offshore Federal

Plat prepared by: Wade McGee (BP Solutions)

WM



Note: Nearest Louisiana shoreline distance was computed from the Proposed Surface Location of the MC778 Surface Pump to the nearest shoreline feature as represented in the NOAA 1:24k Continuously Updated Shoreline Product (CUSP).

Grid North
N
W E
S
Grid: BLM Zone 16 North
Datum: NAD27
Units: US Survey Feet

"Vicinity Chart"

	BP EXPLORATION AND PRODUCTION		Scale 1" = 40 miles
	Proposed Pump Location OCS-G09868 MC778		Date: 2/5/2026
	Mississippi Canyon Area (OPD# NH16-10) Block 778	Offshore Federal	
	Plat prepared by: Wade McGee (BP Solutions)		WM

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

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 35 of 39
Uncontrolled when printed or stored locally			

TABLE 1. ESTIMATED MISCELLANEOUS DISCHARGES AT THE SURFACE OR SUBSEA FOR THE BP LEASE BLOCK OFFSHORE GULF OF AMERICA													
Surface Block Abbreviation		+ Surface Block Number				Surface		Lat		minutes degree seconds			
MC 778						28° 13' 01.088"		Long		88° 29' 38.379"			
Subsea DOCD OCS		G14658				Subsea NOI-PF#		0109		Decimal Degrees Lat			
28.2169689		Long		-88.493994									
Project Name:		Thunder Horse Subea Pump		Suface NOI-PF#		M/V Deep Star eNOI in Process		Marine Vessel or MODU / Rig at Surface				M/V Deep Star	
Subsea Project Days		97		planned + high side NPT		15		DAYS Not to Exceed		112			

TABLE 2. WASTES YOU WILL TRANSPORT AND /OR DISPOSE OF ONSHORE							
Pease specify whether the amount reported is a total or per well			Number of operational days:		167	Asset Name:	Thunderhorse
Well Name: THunderhorse Subsea Pump	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	SBM from service - has not been downhole		Liquid mud storage on workboat	Baroid / MI Swaco Fouchon LA			For Reclamation & re-use
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	0	bbls/well	Landfill/ Deepwell injection on land
Contaminated Synthetic base mud	SBM interface		Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360, Fouchon, LA		bbls/well	Landfill/ Deepwell injection on land
Used Synthetic base mud - from downhole	SBM from downhole - sent in to vendor for reuse		Liquid mud storage on workboat	Baroid / MI Swaco Fouchon LA			For Reclamation & re-use
Drilling mud contaminated absorbents	Absorbent pads contaminated with drilling muds		Barged in (Omega 2 yard boxes)	Omega Waste Management, Patterson, LA		tons/well	Recycle
Excess barite	Excess barite from vessel tank cleaning		Barged in (supersacks)	River Birch Landfill, Avondale, LA		tons/well	Reuse / Landfill
Excess cement	Excess cement from vessel tank cleaning		Barged in (supersacks)	River Birch Landfill, Avondale, LA	0	tons/well	Reuse / Landfill
Rig Drilling washwater	Cleaning out of mud tanks		Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360, Fouchon LA	0	bbls/well	Landfill/ Deepwell injection on land
Contaminated Completion Fluids	Used Completion fluids		Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360 Fouchon LA		bbls/well	Landfill/ Deepwell injection on land
Completion Fluids	Used Completion fluids		Liquid storage tanks on workboat	Ecoserv / MI Swaco Fouchon LA		bbls/well	Landfill/ Deepwell injection on land
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	0.1002	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	50.1	ton/well	Incineration / Landfill
Rig Maintenance Wastes (non hazardous)	Oily rags, pads, oil filters etc.		Barged in (totes)	Omega Waste Management, Patterson, LA	23.38	ton/well	Reuse / Landfill
Rig Used oil	Lube oil, hydraulic oil, glycol		Barged in (drums)	Omega Waste Management, Patterson, LA	10.02	bbls/well	Recycle
Domestic waste	Municipal trash		Barged in (supersacks)	River Birch Landfill, Avondale, LA	4.175	ton/well	Incineration / Landfill
Scrap Metal	scrap piping, grating and other metals		Barged in (scrap baskets)	Southern Scrap, Houma, LA	38.41	ton/well	Recycle
Universal Waste	Batteries		Barged in (DOT drums)	LEI, Hammond, LA	0.668	ton/well	Recycle
Universal Waste	Fluorescent light bulbs		Barged in (DOT drums)	LEI, Hammond, LA	0.167	ton/well	Recycle
Misc. unused chemical	Pills, spacers, additives etc.		Barged in (totes)	River Birch Landfill, Avondale, LA	567.8	bbls/well	Recycle

Appendix E: Air Emissions Information – Form BOEM-0139

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 36 of 39
Uncontrolled when printed or stored locally			

DOCD/DPP - AIR QUALITY

OMB Control No. 1010-0151
OMB Approval Expires: 08/31/2023

COMPANY	BP Exploration & Production Inc.
AREA	Mississippi Canyon
BLOCK	775, 776, 777, 778, 821, 822
LEASE	OCS-G 09866, 09867, 09868, 14657, 14658, 19997
FACILITY	Thunder Horse
WELL	778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009, TA010, TB001, TB003, TC002, TC003, TD001, TD002, TD003, TD004, TF001, TF002, TG001, TG002, TG003, TG004, TI001, TH001, TH002, TJ001, TK001, TK002, 002 ST01BP00, 004 ST01BP00, 777-007, 822-6, 822-1, 777-1 Future Wells: 778WIXi-1, SPc1W, SPc3W, SB21(822-20), NPi15 (777-10 S-8090), SPc12 (822-23), SPi7 (778-13), SPi4W (778-7), SPc5 (822-24), SPi5W (778-14), SPi5 (778-16), NPc (777-2), NBr2 (776-10/"AB" N-7469), NPi21 (775-4/"BG" S-7868), SB10 (822-19), SB17 (822-21)
COMPANY CONTACT	Air Quality (Ramesh Gopal)/ Plans (Angie Batchelor)
TELEPHONE NO.	Air Quality (409-655-4418)/ Plans (281-658-7305)
REMARKS	Actual fuel used for Black Lion, Black Hornet, W Auriga drillships

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:		
YEAR	NUMBER OF PIPELINES	TOTAL NUMBER OF CONSTRUCTION DAYS
2023	see OSC Plan Info Form 0137	
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		

AIR EMISSIONS COMPUTATION FACTORS

Fuel Usage Conversion Factors		Natural Gas Turbines		Natural Gas Engines		Diesel Recip. Engine		Diesel Turbines		DATE	Reference Links
		SCF/hp-hr	9.524	SCF/hp-hr	7.143	GAL/hp-hr	0.0514	GAL/hp-hr	0.0514		
Equipment/Emission Factors	units	TSP	PM 10	PM 2.5	SOx	NOx	VOC	Pb	CO	NH3	REF.
Natural Gas Turbine	g/hp-hr		0.0086	0.0086	0.0026	1.4515	0.0095	N/A	0.3719	N/A	AP42 3.1-18.3.1-2a
RECIP: 2 Cycle Lean Natural Gas	g/hp-hr		0.1293	0.1293	0.0020	6.5998	0.4062	N/A	1.2009	N/A	AP42 3.2-1
RECIP: 4 Cycle Lean Natural Gas	g/hp-hr		0.0002	0.0002	0.0020	2.8814	0.4014	N/A	1.8949	N/A	AP42 3.2-2
RECIP: 4 Cycle Rich Natural Gas	g/hp-hr		0.0323	0.0323	0.0020	7.7224	0.1021	N/A	11.9408	N/A	AP42 3.2-3
Diesel Recip. < 600 hp	g/hp-hr	1	1	1	0.0279	14.1	1.04	N/A	3.03	N/A	AP42 3.3-1
Diesel Recip. > 600 hp	g/hp-hr	0.32	0.182	0.178	0.0055	10.9	0.29	N/A	2.5	N/A	AP42 3.4-1 & 3.4-2
Diesel Boiler	lbs/bbl	0.0840	0.0420	0.0105	0.0089	1.0080	0.0084	5.14E-05	0.2100	0.0336	AP42 1.3-6; Pb and NH3: W6AFRE (28/2018)
Diesel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0013	4.45E-05	0.0105	N/A	AP42 3.1-1 & 3.1-2a
Dual Fuel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0095	4.45E-05	0.3719	0.0000	AP42 3.1-18.3.1-2a; AP42 3.1-1 & 3.1-2a
Vessels – Propulsion	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA, 2017 NETSP refer to Diesel Recip. > 600 hp reference
Vessels – Drilling Prime Engine, Auxiliary	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA, 2017 NETSP refer to Diesel Recip. > 600 hp reference
Vessels – Diesel Boiler	g/hp-hr	0.0468	0.1491	0.1417	0.0047	1.4914	0.0820	3.73E-05	0.1491	0.0003	USEPA, 2017 NETSP (units converted) refer to Diesel Boiler Reference
Vessels – Weld Simulation	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA, 2017 NETSP refer to Diesel Recip. > 600 hp reference
Natural Gas Heater/Boiler/Burner	lbs/MMscf	7.60	1.90	1.90	0.60	190.00	5.50	5.00E-04	84.00	3.2	AP42 1.4-1 & 1.4-2; Pb and NH3: W6AFRE (28/2018)
Combustion Flare (no smoke)	lbs/MMscf	0.00	0.00	0.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2
Combustion Flare (light smoke)	lbs/MMscf	2.10	2.10	2.10	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2
Combustion Flare (medium smoke)	lbs/MMscf	10.50	10.50	10.50	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2
Combustion Flare (heavy smoke)	lbs/MMscf	21.00	21.00	21.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2
Liquid Flaring	lbs/bbl	0.42	0.0966	0.0651	5.964	0.84	0.01428	5.14E-05	0.21	0.0336	AP42 1.3-1 through 1.3-3 and 1.3-5
Storage Tank	tons/yr/tank						4.300				2014 Gulfwide Inventory, Avg. ems (upper bound of 95% CI)
Fugitives	lbs/hr/component						0.0005				AP Study
Glycol Dehydrator	tons/yr/dehydrator						19.240				2011 Gulfwide Inventory, Avg. ems (upper bound of 95% CI)
Cold Vent	tons/yr/vent						44.747				2014 Gulfwide Inventory, Avg. ems (upper bound of 95% CI)
Waste Incinerator	lb/ton		15.0	15.0	2.5	2.0	N/A	N/A	20.0	N/A	AP 42 2.1-12
On-ice – Loader	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA, NONFAC2008 model; TSP (units converted) refer to Diesel Recip. <600 reference
On-ice – Other Construction Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA, NONFAC2008 model; TSP (units converted) refer to Diesel Recip. <600 reference
On-ice – Other Survey Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA, NONFAC2008 model; TSP (units converted) refer to Diesel Recip. <600 reference
On-ice – Tractor	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA, NONFAC2008 model; TSP (units converted) refer to Diesel Recip. <600 reference
On-ice – Truck (for gravel island)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA, NONFAC2008 model; TSP (units converted) refer to Diesel Recip. <600 reference
On-ice – Truck (for surveys)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA, NONFAC2008 model; TSP (units converted) refer to Diesel Recip. <600 reference
Man Camp – Operation (max people/day)	tons/person/day		0.0004	0.0004	0.0004	0.006	0.001	N/A	0.001	N/A	BOEM 2014-1001
Vessels – Ice Management Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA, 2017 NETSP refer to Diesel Recip. > 600 hp reference
Vessels – Hovercraft Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA, 2017 NETSP refer to Diesel Recip. > 600 hp reference

Sulfur Content Source	Value	Units
Fuel Gas	3.38	ppm
Diesel Fuel	0.0015	% weight
Produced Gas (Flare)	3.38	ppm
Produced Oil (Liquid Flaring)	1	% weight

Density and Heat Value of Diesel Fuel	
Densitv	7.05 lbs/gal
Heat Value	19,300 Btu/lb

Heat Value of Natural Gas	
Heat Value	1,050 MMBtu/MMscf

Natural Gas Flare Parameters	Value	Units
VOC Content of Flare Gas	0.6816	lb VOC/lb-mol gas
Natural Gas Flare Efficiency	98	%

COUNTRY	COMPANY	VESSEL NAME	VESSEL TYPE	EQUIPMENT ID	EQUIPMENT	RATING	MAX FUEL GALLONS	ACT FUEL GALLONS	WELL	WELL TYPE	WELL ID	WELL NAME	WELL STATUS	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE	WELL DATE	WELL TIME	WELL TYPE
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Company	Area	Equipment	Equipment ID	Rating	Max Fuel	Act Fuel	Well	Contract	Phone	Remarks	Maximum Pounds per Hour																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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ESTIMATED TONS

OPERATIONS

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Non-Gas Engines
Burners

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SCFR

MAX FUEL
GAL/HR
SCFD

RATING
HP
SCFR

ACT. FUEL
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SCFD

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AIR EMISSIONS CALCULATIONS

COMPANY		AREA	BLOCK	LEASE	FACILITY	WELL			
BP Exploration & Production Inc.		Mississippi Canyon	775, 776, 777, 778, 821, 822	OCS-G 09866, 09867, 09868, 14657, 14658, 19997	Thunder Horse	778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009, TA010, TB001, TB003, TC002, TC003, TD001, TD002, TD003, TD004, TF001, TF002, TG001, TG002, TG003, TG004, TI001, TH001, TH002, TJ001, TK001, TK002, 002 ST01BP00, 004 ST01BP00, 777-007, 822-6, 822-1, 777-1 Future Wells: 778WIXi-1, SPc1W, SPc3W, SB21(822-20), NPi15 (777-10 S-8090), SPc12 (822-23), SPI7 (778-13), SPI4W (778-7), SPc5 (822-24), SPI5W (778-14), SPI5 (778-16), NPc (777-2), NBr2 (776-10"AB" N-7469), NPi21 (775-4"BG" S-7868), SB10 (822-19), SB17 (822-21)			
Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2023	331.95	224.16	219.26	10.92	10727.57	1473.20	0.03	2485.41	1.65
2024	497.04	323.77	315.87	13.33	14683.01	1586.93	0.04	3105.81	2.80
2025	317.01	215.15	210.51	10.71	10369.59	1462.91	0.02	2429.26	1.54
2026	319.38	216.58	211.90	10.74	10426.27	1464.54	0.02	2438.15	1.56
2027	273.48	188.88	185.04	10.07	9326.56	1432.92	0.02	2265.66	1.24
2028	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2029	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2030	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2031	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2032	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
Allowable	2131.20			2131.20	2131.20	2131.20		54400.00	

BP CONFIDENTIAL



THUNDER HORSE

Offshore and
Coastal NAAQS Air
Quality Impact
Assessment

40 Shattuck Road | Suite 110
Andover, Massachusetts 01810
800.426.4262

woodardcurran.com

0234596.00

**BP Exploration &
Production, Inc**
January 2023

TABLE OF CONTENTS

SECTION	PAGE NO.
1. INTRODUCTION	1-1
2. AIR QUALITY IMPACT ASSESSMENT	2-1
2.1 Previous Modeling Analysis Results	2-1
2.2 Current Thunder Horse Project Assessment	2-2
3. SUMMARY	3-1

TABLES

Table 1-1: Summary of Hypothetical Project Emissions by Year

Table 1-2: Comparison of Emission Categories Modeled Previously (February 2019) and Proposed for The Current Thunder Horse Project

Table 2-1: February 2019 Thunder Horse NO_x Modeling Assessment Results, All Concentrations are in µg/m³ (taken directly from February 2019 report).

Table 2-2: NO₂ Monitored Data at Kenner

FIGURES

Figure 1-1: Locations of Previously Modeled Sources (February 2019 Thunder Horse Analysis) and Current Proposed Thunder Horse Sources

APPENDICES

Appendix A: Emissions Data

1. INTRODUCTION

BP Exploration & Production Inc. (BP) submitted a project update to the Initial Development Operations Coordination Document (DOCD) for the Thunder Horse project and semi-submersible Floating Production Unit (FPU) which included an offshore and coastal air quality modeling report dated February 2019. The February 2019 modeling analysis for all Thunder Horse aggregated projects demonstrated that the conservative worst-case operating year will have no significant annual impacts at the nearest shoreline, will not interfere with the attainment of the NO₂ NAAQS, and will meet applicable BOEM air quality analysis requirements. The current project is a revision and extension of vessel scheduling of that previously modeled project with less model-applicable emissions in the same or more distant location from shore as previously modeled. Based on the favorable February 2019 modeling results, it can therefore be extrapolated that less emissions at the same location offshore would also comply with the applicable NO₂ NAAQS at the coastline and would also have no significant annual impacts at the shoreline. This report serves as a qualitative assessment of the air quality impacts of the smaller current Thunder Horse project relative to the larger aggregated Thunder Horse project modeled in 2019. It demonstrates that the current project will generate less emissions at generally similar or farther distances from shore than the Thunder Horse projects in the aggregate and will not interfere with the attainment of the ambient air quality standards on shore.

BOEM has developed an Excel spreadsheet document (BOEM-139.XLS) to standardize the way potential air emissions for a DOCD are calculated and approved by BOEM. BOEM-139.XLS has been populated with the current Thunder Horse project's emissions scenarios and is provided in Appendix A. These tables list the equipment associated with each operation, the fuel feed rate and the calculated maximum short term (hourly) and annual mass emission rates. The final page of the spreadsheet includes a calculation of the modeling exemption thresholds based on project information. A summary of the current Thunder Horse project's proposed annual emissions for each year and pollutant are provided in Table 1-1. The data indicate that the calculated emissions for the project are below the exemption thresholds for all BOEM listed pollutants, except NO_x. The calculated NO_x emissions for the years 2023 through 2032 are projected to be above the exemption formula threshold (shown as "Allowable" row in the table), thus requiring further analyses of potential emissions impacts. Year 2024 is projected to represent the maximum annual emissions and served as the highest evaluation year for the comparison to the previous modeling assessment.

Table 1-1: Summary of Hypothetical Project Emissions by Year

(maximum year highlighted in blue)

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL				
BP Exploration & Production Inc.	Mississippi Canyon	775, 776, 777, 778, 821, 822	OCS-G 09866, 09867, 09868, 14657, 14658, 19997	Thunder Horse	"778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009, TA010, TB001, TB003, TC002, TC003, TD001, TD002, TD003, TD004, TF001, TF002, TG001, TG002, TG003, TG004, TI001, TH001, TH002, TJ001, TK001, TK002, 002 ST01BP00, 004 ST01BP00, 777-007, 822-6, 822-1, 777-1 Future Wells: 778WIXi-1, SPc1W, SPc3W, SB21(822-20), NPi15 (777-10 S-8090), SPc12 (822-23), SPI7 (778-13), SPI4W (778-7), SPc5 (822-24), SPI5W (778-14), SPI5 (778-16), NPc (777-2), NBr2 (776-10/"AB" N-7469), NPi21 (775-4/"BG" S-7868), SB10 (822-19), SB17 (822-21)"				
Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2023	331.95	224.16	219.26	10.92	10727.57	1473.20	0.03	2485.41	1.65
2024	497.04	323.77	315.87	13.33	14683.01	1586.93	0.04	3105.81	2.80
2025	317.01	215.15	210.51	10.71	10369.59	1462.91	0.02	2429.26	1.54
2026	319.38	216.58	211.90	10.74	10426.27	1464.54	0.02	2438.15	1.56
2027	273.48	188.88	185.04	10.07	9326.56	1432.92	0.02	2265.66	1.24
2028	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2029	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2030	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2031	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2032	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
Allowable	2131.20			2131.20	2131.20	2131.20		54400.00	

Appendix A provides the BOEM-139.XLS forms populated with the current Thunder Horse project's emissions for each year, including the emission factors used in the calculation of annual and hourly emissions from each proposed emission source. Drawing from the Appendix A emissions, a comparison of the previously modeled aggregated project worst case emissions year and the currently proposed Thunder Horse project worst case emissions year, representative emission source inventory categories and associated emission rates are presented in Table 1-2. The current Thunder Horse project constitutes a decrease of emissions relative to the February 2019 aggregated plan for all equipment categories, except for the FPU's gas turbines and the emergency vessels (fast rescue craft and lifeboats).

The current Thunder Horse project's worst year emissions that are applicable to modeling (no fast rescue craft, lifeboat, or flaring emissions; FPU turbines run on diesel conservatively) are expected to be 66% of total modeled maximum hourly emissions from the Thunder Horse aggregated project, with a total project-wide reduction of more than 4,062 pounds an hour of NO_x. On an annual basis, the expected emissions will be 83% of the annual emissions shown in the February 2019 aggregated plan.

Table 1-2: Comparison of Emission Categories Modeled Previously (February 2019) and Proposed for The Current Thunder Horse Project

Equipment Category	Annual NO _x Emissions			Max. Hourly NO _x Emissions		
	(tons per year)			(pounds per hour)		
	Current Project	Previous Modeling 19-Feb	Delta	Current Project	Previous Modeling 19-Feb	Delta
Diesel Recip. > 600hp	11240.35	13296.13	-2055.78	7346.21	11151.97	-3805.76
Diesel Recip. < 600hp	1198.25	1727.82	-529.57	506.17	763.39	-257.22
Diesel Recip. < 600hp Emerg. ^[1]	0.40	0.40	0.00	15.54	15.42	0.12
TURBINE nat gas	2142.70	1917.34	225.36	489.20	437.75	51.45
Total "Modelable" ^[2]	12438.60	15023.95	-2585.35	7852.38	11915.36	-4062.98
% of previous	83%	-	-	66%	-	-

Notes

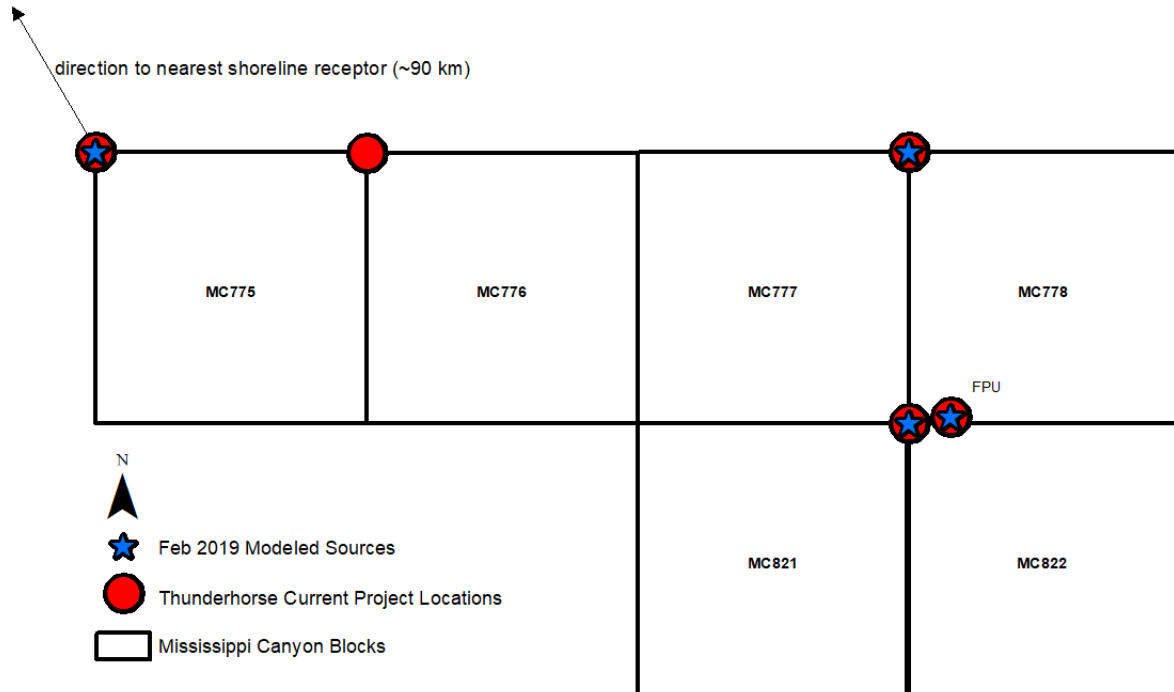
[1]: These emissions are associated with the fast rescue craft and lifeboat engines.

[2]: Emissions either modeled in the February 2019 air quality review, or applicable to modeling in the current plan.

Emissions include turbines fired by diesel conservatively, and excludes gas firing turbines, emergency vessels (fast rescue craft, lifeboats), and flaring.

In addition to emissions characterized by the current Thunder Horse worst case emission year being lower than the previously modeled worst-case emission year of the aggregated Thunder Horse project, the locations of sources previously modeled are generally equivalent to the current Thunder Horse project emission source locations. Figure 1-1 shows the previously modeled locations (blue stars). Previously, conservatism was added to the modeling by placing the emission sources at the nearest-to-shoreline corner of the worst-case emission year blocks. Red circles in Figure 1-1 are associated with expected locations of current Thunder Horse emission sources during the worst-case emissions year. Current Thunder Horse emission sources are within the same multi-block region as previously modeled sources.

Figure 1-1: Locations of Previously Modeled Sources (February 2019 Thunder Horse Analysis) and Current Proposed Thunder Horse Sources



2. AIR QUALITY IMPACT ASSESSMENT

2.1 Previous Modeling Analysis Results

In the February 2019 Thunder Horse modeling analysis, potential air quality impacts resulting from the maximum annual emissions profile for activities associated with the Thunder Horse project and Floating Production Unit (FPU) were determined. The CALPUFF modeling system (comprised of CALMET v6.4.0, CALPUFF v6.42, and CALPOST v6.292) was applied with four years of meteorological data (2000-2002 and 2004) supplied by the Bureau of Ocean Energy Management (BOEM).

The CALPUFF modeling analyses was performed assuming a maximum hourly emission rate of 11,915 pounds per hour to determine potential impacts. Consistent with the Environmental Protection Agency (EPA) methodology and other recently approved BP projects, that emission rate did not include flare, lifeboat, or fast rescue craft emissions and conservatively assumed that diesel fuel was combusted in all dual-fuel turbines on the production platform instead of natural gas (the normal operating fuel). Annual average emissions were scaled to 32.6% of 11,915 pounds per hour or 17,043 tons per year. In addition, all four years were averaged at each receptor location maintaining spatial consistency with 4-year averages found for both annual and hourly impacts. The February 2019 CALPUFF model analysis results are summarized in Table 2-1:

Table 2-1: February 2019 Thunder Horse NO_x Modeling Assessment Results, All Concentrations are in $\mu\text{g}/\text{m}^3$ (taken directly from February 2019 report).

Year	2000		2001		2002		2004		4-year Average	4-year Max
Averaging Period	1-Hour	Annual**	1-Hour	Annual**	1-Hour	Annual**	1-Hour	Annual**	1-Hour	Annual**
Rank	High 8th High	Max	High 8th High	Max	High 8th High	Max	High 8th High	Max	High 8th High	Max
Shoreline Predicted Impacts*	41.83	0.52	52.53	0.50	54.34	0.59	41.42	0.48	45.66	0.59
Significance Level	-	1	-	1	-	1	-	1	-	1

* Assumed 100% conversion of NO_x to NO₂

** Annual modeled results scaled according to the ratio of estimated annual emissions to maximum annual emissions. See data below.

max hourly emissions	11,915.36 lb/hr
max annual emissions	52,225 ton/yr
estimated annual emissions	17,042.99 ton/yr
scaling ratio	32.6% [estimated / max]

A background NO₂ design concentration from the Kenner, LA monitor was obtained and a 3-year average (2016-2018) of the 98th percentile of measured one-hour concentrations data was calculated to be 70.86 $\mu\text{g}/\text{m}^3$. When added to the 4-year average modeled high 8th high 1-hour concentrations (45.66 $\mu\text{g}/\text{m}^3$), the resulting maximum concentration at the shoreline was calculated to be 116.52 $\mu\text{g}/\text{m}^3$. This impact was well below the NAAQS of 188 $\mu\text{g}/\text{m}^3$. Further, as shown on the table above, the 4-year maximum of the annual average impact concentrations of the project at the shore (0.59 $\mu\text{g}/\text{m}^3$) was below the annual average modeling Significant Impact Level (SIL) (1.0 $\mu\text{g}/\text{m}^3$) and required no further analysis. These modeling analyses demonstrated that the aggregated Thunder Horse project worst case operating emissions will have no significant annual impacts at the nearest shoreline, will not interfere with the attainment of the NO₂ NAAQS, and will meet the applicable BOEM air quality analyses requirements.

2.2 Current Thunder Horse Project Assessment

The current Thunder Horse project will consist of a reduced emission source inventory and a fraction of the NO_x emission rates previously modeled in the February 2019 analysis (Table 1-1). It is also expected that the locations of the emissions sources of the current Thunder Horse project will be generally equivalent or more distant than the previously modeled emission source locations (Figure 1-1). Therefore, a rough conservative assessment of expected shoreline impacts from the current Thunder Horse emission sources can be extrapolated from the previous modeling assessment. Based on Table 1-1, the annual average NO₂ concentration at the maximum modeled location can be conservatively estimated by applying the ratio of the proposed rates to the prior NO_x emission rates, or 83% of the predicted maximum (0.59 µg/m³, Table 2-1), resulting in 0.49 µg/m³. This is well below the annual NO₂ significance level of 1 µg/m³. Similarly, the one-hour eight highest maximum value (45.66 µg/m³, Table 2-1) can be estimated conservatively by applying the ratio of the hourly emission rates proposed for the current Thunder Horse project to prior modeled rate, or 66%. This would lead to an estimated commensurate shoreline impact of 30.13 µg/m³. To assess the potential total ambient air quality one-hour average concentration for comparison to the NAAQS, this value should be combined with the design background value monitored at the Kenner, LA station for the most recent three years of data collection. Table 2-2 provides an updated table of the 98th percentile concentration for each year monitored for the period 2011 to 2021 (most recent full year of data available at the time of this report).

Table 2-2: NO₂ Monitored Data at Kenner

YEAR	98th Percentile Daily Max (ppb)	98th Percentile Daily Max (µg/m ³)	Days Missing	4 Quarters Available?
2011	51	95.95	32	YES
2012	46	86.54	9	YES
2013	46	86.54	14	YES
2014	42	79.02	12	YES
2015	45	84.66	24	YES
2016	39	73.37	7	YES
2017	37	69.61	4	YES
2018	37	69.61	10	YES
2019	36	67.73	5	YES
2020	34	63.97	6	YES
2021	37	69.61	43	YES
3-year average	35.67	67.10		

Source: Kenner, LA Monitor ID 220511001, EPA Air Quality System Data Mart; accessed December 2022.

The maximum NO₂ design value monitored in the most recent three years is 67.10 µg/m³. Therefore, the total estimated one-hour NO₂ concentration resulting from the current Thunder Horse project is estimated to be 97.23 µg/m³ compared to the NAAQS of 188 µg/m³.

3. SUMMARY

The current Thunder Horse project is proposed to feature lower worst case and generally equivalent or more distant emissions than previously modeled emissions which demonstrated compliance with air quality thresholds at the shoreline. This report conservatively estimated a commensurate modeled shoreline annual and 1-hour NO₂ impact based on current Thunder Horse proposed NO_x emissions and locations relative to those previously modeled. The estimated shoreline impacts demonstrate the current Thunder Horse project will have no significant annual impact and will not interfere with the attainment or maintenance of the NO₂ NAAQS.

APPENDIX A: EMISSIONS DATA

DOCD/DPP - AIR QUALITY

OMB Control No. 1010-0151
OMB Approval Expires: 08/31/2023

COMPANY	BP Exploration & Production Inc.
AREA	Mississippi Canyon
BLOCK	775, 776, 777, 778, 821, 822
LEASE	OCS-G 09866, 09867, 09868, 14657, 14658, 19997
FACILITY	Thunder Horse
WELL	778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009, TA010, TB001, TB003, TC002, TC003, TD001, TD002, TD003, TD004, TF001, TF002, TG001, TG002, TG003, TG004, TI001, TH001, TH002, TJ001, TK001, TK002, 002 ST01BP00, 004 ST01BP00, 777-007, 822-6, 822-1, 777-1 Future Wells: 778WIXi-1, SPc1W, SPc3W, SB21(822-20), NPi15 (777-10 S-8090), SPc12 (822-23), SPi7 (778-13), SPi4W (778-7), SPc5 (822-24), SPi5W (778-14), SPi5 (778-16), NPc (777-2), NBr2 (776-10/"AB" N-7469), NPi21 (775-4/"BG" S-7868), SB10 (822-19), SB17 (822-21)
COMPANY CONTACT	Air Quality (Ramesh Gopal)/ Plans (Cathy Nesbit)
TELEPHONE NO.	Air Quality (409-655-4418)/ Plans (281-896-5128)
REMARKS	Actual fuel used for Black Lion, Black Hornet, W Auriga drillships

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:		
YEAR	NUMBER OF PIPELINES	TOTAL NUMBER OF CONSTRUCTION DAYS
2023	see OSC Plan Info Form 0137	
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		

Fuel Usage Conversion Factors	Natural Gas Turbines				Natural Gas Engines		Diesel Recip. Engine		Diesel Turbines			
	SCF/hp-hr	9.524			SCF/hp-hr	7.143	GAL/hp-hr	0.0514	GAL/hp-hr	0.0514		

Equipment/Emission Factors	units	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	REF.	DATE	Reference Links
Natural Gas Turbine	g/hp-hr		0.0086	0.0086	0.0026	1.4515	0.0095	N/A	0.3719	N/A	AP42 3.1-1& 3.1-2a	4/00	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
RECIP. 2 Cycle Lean Natural Gas	g/hp-hr		0.1293	0.1293	0.0020	6.5998	0.4082	N/A	1.2009	N/A	AP42 3.2-1	7/00	https://www3.epa.gov/ttn/chie1/ap42/ch03/final/c03s02.pdf
RECIP. 4 Cycle Lean Natural Gas	g/hp-hr		0.0002	0.0002	0.0020	2.8814	0.4014	N/A	1.8949	N/A	AP42 3.2-2	7/00	https://www3.epa.gov/ttn/chie1/ap42/ch03/final/c03s02.pdf
RECIP. 4 Cycle Rich Natural Gas	g/hp-hr		0.0323	0.0323	0.0020	7.7224	0.1021	N/A	11.9408	N/A	AP42 3.2-3	7/00	https://www3.epa.gov/ttn/chie1/ap42/ch03/final/c03s02.pdf
Diesel Recip. < 600 hp	g/hp-hr	1	1	1	0.0279	14.1	1.04	N/A	3.03	N/A	AP42 3.3-1	10/96	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s03.pdf
Diesel Recip. > 600 hp	g/hp-hr	0.32	0.182	0.178	0.0055	10.9	0.29	N/A	2.5	N/A	AP42 3.4-1 & 3.4-2	10/96	https://www3.epa.gov/ttn/chie1/ap42/ch03/final/c03s04.pdf
Diesel Boiler	lbs/bbl	0.0840	0.0420	0.0105	0.0089	1.0080	0.0084	5.14E-05	0.2100	0.0336	AP42 1.3-6; Pb and NH3: WebFIRE (08/2018)	9/98 and 5/10	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s03.pdf https://cfpub.epa.gov/webfire/
Diesel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0013	4.45E-05	0.0105	N/A	AP42 3.1-1 & 3.1-2a	4/00	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
Dual Fuel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0095	4.45E-05	0.3719	0.0000	AP42 3.1-1& 3.1-2a; AP42 3.1-1 & 3.1-2a	4/00	https://cfpub.epa.gov/webfire/
Vessels – Propulsion	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
Vessels – Drilling Prime Engine, Auxiliary	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	
Vessels – Diesel Boiler	g/hp-hr	0.0466	0.1491	0.1417	0.4400	1.4914	0.0820	3.73E-05	0.1491	0.0003	USEPA 2017 NEI;TSP (units converted) refer to Diesel Boiler Reference	3/19	
Vessels – Well Stimulation	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	
Natural Gas Heater/Boiler/Burner	lbs/MMscf	7.60	1.90	1.90	0.60	190.00	5.50	5.00E-04	84.00	3.2	AP42 1.4-1 & 1.4-2; Pb and NH3: WebFIRE (08/2018)	7/98 and 8/18	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf https://cfpub.epa.gov/webfire/
Combustion Flare (no smoke)	lbs/MMscf	0.00	0.00	0.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	https://www3.epa.gov/ttn/chie1/ap42/ch13/final/C13S05_02-05-18.pdf
Combustion Flare (light smoke)	lbs/MMscf	2.10	2.10	2.10	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Combustion Flare (medium smoke)	lbs/MMscf	10.50	10.50	10.50	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Combustion Flare (heavy smoke)	lbs/MMscf	21.00	21.00	21.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Liquid Flaring	lbs/bbl	0.42	0.0966	0.0651	5.964	0.84	0.01428	5.14E-05	0.21	0.0336	AP42 1.3-1 through 1.3-3 and 1.3-5	5/10	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf
Storage Tank	tons/yr/tank							4.300			2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Fugitives	lbs/hr/component							0.0005			API Study	12/93	https://www.apiwebstore.org/publications/item.cgi?9879d38a-8bc0-4abe-bb5c-9b623870125d
Glycol Dehydrator	tons/yr/dehydrator										2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2014	https://www.boem.gov/environment/environmental-studies/2011-gulfwide-emission-inventory
Cold Vent	tons/yr/vent										2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory_
Waste Incinerator	lb/ton		15.0	15.0	2.5	2.0	N/A	N/A	20.0	N/A	AP 42 2.1-12	10/96	https://www3.epa.gov/ttnchie1/ap42/ch02/final/c02s01.pdf
On-Ice – Loader	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	https://www.epa.gov/moves/nonroad2008a-installation-and-updates
On-Ice – Other Construction Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Other Survey Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Tractor	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Truck (for gravel island)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Truck (for surveys)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
Man Camp - Operation (max people/day)	tons/person/day		0.0004	0.0004	0.0004	0.006	0.001	N/A	0.001	N/A	BOEM 2014-1001	2014	https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/2014-1001.pdf
Vessels - Ice Management Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	inventory-nei-data
Vessels - Hovercraft Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	inventory-nei-data

Sulfur Content Source	Value	Units
Fuel Gas	3.38	ppm
Diesel Fuel	0.0015	% weight
Produced Gas (Flare)	3.38	ppm
Produced Oil (Liquid Flaring)	1	% weight

Natural Gas Flare Parameters	Value	Units
VOC Content of Flare Gas	0.6816	lb VOC/lb-mol gas
Natural Gas Flare Efficiency	98	%

Density and Heat Value of Diesel Fuel		
Density	7.05	lbs/gal
Heat Value	19,300	Btu/lb

Heat Value of Natural Gas		
Heat Value	1,050	MMBtu/MMscf

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT				PHONE	REMARKS																
BP Exploration & Production Inc.	Mississippi Canyon	775, 776, 777, 778, 821, 822	OCS-G 09866, 0	Thunder Horse	778-008, 778-019, 778-020	TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009				Air Quality (Ramesh Gopal)/ Plans (4 Air Quality (409-655-4418)/ Plans (2 Actual fuel used for Black Lion, Black Hornet, W Auriga drillships																	
OPERATIONS	EQUIPMENT	EQUIPMENT ID	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	SCFD																						
	Burners		MMBTU/HR	SCF/HR	SCFD	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3		
DRILLING - Black Hornet (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage Maximum Daily Fuel Usage				13210 34818																						
Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V Egen: Cummins 1900 kW Temporary Large/ Small Auxiliary Engines	VESSELS- Drilling - Propulsion Engine - Diesel Vessels – Drilling Prime Engine, Auxiliary Vessels – Drilling Prime Engine, Auxiliary		60354 2458 2500	3104.97 126.45 128.62	34818.00 3034.90 3086.76	24 2 24	365 53 365	42.58 1.73 1.76	25.69 1.05 1.06	24.92 1.01 1.03	0.62 0.03 0.03	1020.15 41.55 42.26	29.33 1.19 1.21	0.00 0.00 0.00	160.01 6.52 6.63	0.30 0.01 0.01	87.14 0.09 7.73	52.57 0.06 4.66	50.99 0.05 4.52	1.27 0.00 0.11	2087.71 2.20 185.08	60.03 0.06 5.32	0.01 0.00 0.00	327.45 0.35 29.03	0.61 0.00 0.05		
DRILLING - Black Lion (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage Maximum Daily Fuel Usage				16455 23326																						
Main Engines: 6 x HIMSEN (6036 hp ea) + 2 x HIMSEN (12069 Egen: 1 x Cummins, 2548hp Temporary Large/ Small Auxiliary Engines	VESSELS- Drilling - Propulsion Engine - Diesel Vessels – Drilling Prime Engine, Auxiliary Vessels – Drilling Prime Engine, Auxiliary		60354 2548 2500	3104.97 131.08 128.62	23326.00 3146.03 3086.76	24 2 24	39 6 39	42.58 1.80 1.76	25.69 1.08 1.06	24.92 1.05 1.03	0.62 0.03 0.03	1020.15 43.07 42.26	29.33 1.24 1.21	0.00 0.00 0.00	160.01 6.76 6.63	0.30 0.01 0.01	6.24 0.01 0.83	3.76 0.01 0.50	3.65 0.01 0.48	0.09 0.00 0.01	149.44 0.26 19.78	4.30 0.01 0.57	0.00 0.00 0.00	23.44 0.04 3.10	0.04 0.00 0.01		
DRILLING: West Auriga Drillship (Substitution likely with similar vessel of same/ lower horsepower)	Average Daily Fuel Usage Maximum Daily Fuel Usage				9971 36288																						
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea. E-Gen: 1 x Leroy Somer, 2145 hp Temporary Large/ Small Auxiliary Engines	VESSELS- Drilling - Propulsion Engine - Diesel Vessels – Drilling Prime Engine, Auxiliary Vessels – Drilling Prime Engine, Auxiliary			0.00 0.00 0.00	0.00 0.00 0.00	24 2 24	0 0 0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00			
DRILLING - MODU TBD 1 (based on W Auriga) (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage Maximum Daily Fuel Usage																										
Main Engines Egen Temporary Large/ Small Auxiliary Engines	VESSELS- Drilling - Propulsion Engine - Diesel Vessels – Drilling Prime Engine, Auxiliary Vessels – Drilling Prime Engine, Auxiliary		65262 2145 2500	3357.47 110.35 128.62	80579.25 2649.44 3086.76	24 2 24	105 15 105	46.04 1.51 1.76	27.78 0.91 1.06	26.94 0.89 1.03	0.67 0.02 0.03	1103.10 36.26 42.26	31.72 1.04 1.21	0.00 0.00 0.00	173.02 5.69 6.63	0.32 0.01 0.01	58.01 0.02 2.22	35.00 0.01 1.34	33.95 0.01 1.30	0.84 0.00 0.03	1389.91 0.54 53.24	39.96 0.02 1.53	0.00 0.00 0.00	218.00 0.09 8.35	0.41 0.00 0.02		
CONSTRUCTION / WELL INTERVENTION																											
CONSTRUCTION / INTERVENTION: Island Venture (Substitution likely with similar vessels of same or lower horsepower)					2923 5711																						
Main Engines: 4 x CAT C280-12 Generators: 2 x CAT 280-8 Egen: 1 x CAT 3512 Temporary Large/ Small Auxiliary Engines	VESSELS -Construction/Intervention - Diesel VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary		20384 6786 1920 2500	1048.68 349.11 98.78 128.62	5711.00 8378.70 2370.63 3086.76	24 24 2 24	238 238 34 238	14.38 4.79 1.35 1.76	8.68 2.89 0.82 1.06	8.42 2.80 0.79 1.03	0.21 0.07 0.02 0.03	344.54 114.70 32.45 42.26	9.91 3.30 0.93 1.21	0.00 0.00 0.00 0.00	54.04 17.99 5.09 6.63	0.10 0.03 0.01 0.01	9.32 13.67 0.05 5.04	5.62 8.25 0.03 3.04	5.45 8.00 0.03 2.95	0.14 0.20 0.00 0.07	223.29 327.59 1.10 120.69	6.42 9.42 0.03 3.47	0.00 0.00 0.00 0.00	35.02 51.38 0.17 18.93	0.07 0.10 0.00 0.04		
CONSTRUCTION / INTERVENTION: Island Intervention (Substitution likely with similar vessels of same or lower horsepower)																											
Main Engines/Power: 4 x Rolls Royce B32:40 Generator: 1 x 695kW Egen: 1 x 220kW Temporary Large/ Small Auxiliary Engines	VESSELS -Construction/Intervention - Diesel VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary		19310 932 295 2500	993.42 47.95 15.18 128.62	23842.13 1150.74 364.24 3086.76	24 2 2 24	140 140 20 140	13.62 0.66 0.21 1.76	8.22 0.40 0.13 1.06	7.97 0.38 0.12 1.03	0.20 0.01 0.00 0.03	326.39 15.75 4.99 42.26	9.38 0.45 0.14 1.21	0.00 0.00 0.00 0.00	51.19 2.47 0.78 6.63	0.10 0.00 0.00 0.01	22.89 0.09 0.00 2.96	13.81 0.06 0.00 1.79	13.39 0.05 0.00 1.73	0.33 0.00 0.00 0.04	548.34 2.21 0.10 70.99	15.77 0.06 0.00 2.04	0.00 0.00 0.00 0.00	86.01 0.35 0.02 11.13	0.16 0.00 0.00 0.02		
CONSTRUCTION / INTERVENTION: C-Constructor (Substitution likely with similar vessels of same or lower horsepower)																											
Main Engines: 6 x 1700 kW Egen: 1 x 425 kW Temporary Large/ Small Auxiliary Engines	VESSELS -Construction/Intervention - Diesel VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary		13680 570 2500	703.78 29.32 128.62	16890.75 703.78 3086.76	24 2 24	39 6 39	9.65 0.40 1.76	5.82 0.24 1.06	5.65 0.24 1.03	0.14 0.01 0.03	231.23 9.63 42.26	6.65 0.28 1.21	0.00 0.00 0.00	36.27 1.51 6.63	0.07 0.00 0.01	4.52 0.00 0.83	2.72 0.00 0.50	2.64 0.00 0.48	0.07 0.00 0.01	108.22 0.06 19.78	3.11 0.00 0.57	0.00 0.00 0.00	16.97 0.01 3.10	0.03 0.00 0.01		
CONSTRUCTION / INTERVENTION: MV Holiday (Substitution likely with similar vessels of same or lower horsepower)																											
Main Engines: 2 x Cat C280-16 Generators: 5 x 910kW Egen: 1 x 250 kW Temporary Large/ Small Auxiliary Engines	VESSELS -Construction/Intervention - Diesel VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary		18800 6100 335 2500	967.18 313.82 17.23 128.62	23212.44 7531.69 413.63 3086.76	24 24 2 24	60 60 9 60	13.26 4.30 0.24 1.76	8.00 2.60 0.14 1.06	7.76 2.52 0.14 1.03	0.19 0.06 0.00 0.03	317.77 103.11 5.66 42.26	9.14 2.96 0.16 1.21	0.00 0.00 0.00 0.00	49.84 16.17 0.89 6.63	0.09 0.03 0.00 0.01	9.55 3.10 0.00 1.27	5.76 1.87 0.00 0.77	5.59 1.81 0.00 0.74	0.14 0.05 0.00 0.02	228.79 74.24 0.05 30.42	6.58 2.13 0.00 0.87	0.00 0.00 0.00 0.00	35.89 11.64 0.01 4.77	0.07 0.02 0.00 0.01		
PRODUCTION																											
Production Aft Crane - CAT 3408, 525 hp	RECIP.<600hp Diesel	ZZZ-8100	525	27.01	648.22	24	365	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	5.07	5.07	5.07	0.14	71.48	5.27	--	15.36	--		
Compressor Module Crane, CAT 3408, 525 hp	RECIP.<600hp Diesel	ZZZ-8110	525	27.01	648.22	24	365	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	5.07	5.07	5.07	0.14	71.48	5.27	--	15.36	--		
Hurricane Generator, CAT 3306TA, 382 hp	RECIP.<600hp Diesel	ZAN-5900	382	19.65	471.66	2	52	0.84	0.84	0.84	0.02	11.87	0.88	--	2.55	--	0.04	0.04	0.04	0.00	0.62	0.05	--	0.13	--		
RGB Compressor, Cummins QSB6.7, 260 hp	RECIP.<600hp Diesel		260	13.38	321.02	24	183	0.57	0.57	0.57	0.02	8.08	0.60	--	1.74	--	1.26	1.26	1.26	0.00	17.75	1.31	--	3.81	--		
RGB UHP Water Blaster, CAT C-9 Husky, 290 hp	RECIP.<600hp Diesel		290	14.92	358.06	24	183	0.64	0.64	0.64	0.02	9.01	0.66	--	1.94	--	1.40	1.40	1.40	0.04	19.80	1.46	--	4.25	--		
Welding Machines: 4 x 68.4 hp, Lincoln	RECIP.<600hp Diesel		273.6	14.08	337.82	24	50	0.60	0.60	0.60	0.02	8.50	0.63	--	1.83	--	0.36	0.36	0.36	0.01	5.10	0.38	--	1.10	--		
TEMP: Small/ Large Auxiliary Engines (various hp)	RECIP.<600hp Diesel		2500	128.62	3086.76	24	365	5.51	5.51	5.51	0.15	77.71	5.73	--	16.70	--	24.14	24.14	24.14	0.67	340.38	25.11	--	73.15	--		
Fast Rescue Craft - YANMAR 6LPA, 212 hp	RECIP.<600hp Diesel		212	10.91	261.76	1	52	0.47	0.47	0.47	0.01	6.59	0.49	--	1.42	--	0.01	0.01	0.01	0.00	0.17	0.01	--	0.04	--		
Lifeboats: 8 x 36 hp SAAB LS4	RECIP.<600hp Diesel		288	14.82	355.59	1	52	0.63	0.63	0.63	0.02	8.95	0.66	--	1.92	--	0.02	0.02	0.02	0.00	0.23	0.02	--	0.05	--		
Turbine Compressor 1: GE LM2500, 30575 hp, diesel	Dual Fuel Turbine	GNN-5000	30575	1572.96	37751.07	24	50	2.57	0.92	0.92	0.32	188.34	0.64	0.00	25.07	0	1.54	0.55	0.55	0.19	113.01	0.39	0.00	15.04	0.00		
Turbine Compressor 2: GE LM2500, 30575 hp, diesel	Dual Fuel Turbine	GNN-5030	30575	1572.96	37751.07	24	50	2.57	0.92	0.92	0.32	188.34	0.64	0.00	25.07	0	1.54	0.55	0.55	0.19	113.01	0.39	0.00	15.04	0.00		
Turbine Compressor 3: GE LM2500, 30575 hp, diesel	Dual Fuel Turbine	GNN-5060	30575	1572.96	37751.07	24	50	2.57	0.92	0.92	0.32	188.34	0.64	0.00	25.07	0	1.54	0.55	0.55	0.19	113.01	0.39	0.00	15.04	0.00		
Turbine Compressor 4: GE LM2500, 30575 hp, diesel	Dual Fuel Turbine	GNN-5090	30575	1572.96	37751.07	24	50	2.57	0.92	0.92	0.32	188.34	0.64	0.00	25.07	0.00	1.54	0.55	0.55	0.19	113.01	0.39	0.00	15.04	0.00		
Turbine Compressor 5: GE LM2500, 30575 hp, diesel	Dual Fuel Turbine	GNN-5120	30575	1572.96	37751.07	24	50	2.57	0.92	0.92	0.32	188.34	0.64	0.00	25.07	0.00	1.54	0.55	0.55	0.19	113.01	0.39	0.00	15.04	0.00		
Auxiliary Generator 1: Wartsila 18V26, 7188 hp	RECIP.>600hp Diesel	831-CD-001A	7188	369.79	8875.05	24	365	5.07	2.88	2.82	0.09	172.73	4.60	--	39.62	--	22.21	12.63	12.35	0.38	756.56	20.13	--	173.52	--		
Auxiliary Generator 2: Wartsila 18V26, 7188 hp	RECIP.>600hp Diesel	831-CD-001B	7188	369.79	8875.05	24	365	5.07	2.88	2.82	0.09	172.73	4.60	--	39.62	--	22.21	12.63	12.35	0.38	756.56	20.13	--	173.52	--		
Emergency Generator: Wartsila 12V200, 2816 hp	RECIP.>600hp Diesel	941-CD-001	2816	144.87	3476.93	24	90	1.99	1.13	1.11	0.03	67.67	1.80	--	15.52	--	2.15	1.22	1.19	0.04	73.08	1.94	--	16.76	--		
Fire Water Pump C: Wartsila 6L20, 1368 hp	RECIP.>600hp Diesel	174-CD-001A	1368	70.38	1689.08	2	52	0.97	0.55	0.54	0.02	32.87	0.87	--	7.54	--	0.05	0.03	0.03	0.00	1.71	0.05	--	0.39	--		
Fire Water Pump D: Wartsila 6L20, 1368 hp	RECIP.>600hp Diesel	174-CD-001B	1368	70.38	1689.08	2	52	0.97	0.55	0.54	0.02	32.87	0.87	--	7.54	--	0.05	0.03	0.03	0.00	1.71	0.05	--	0.39	--		
Port Drilling Crane: CAT 3412, 750 hp	RECIP.>600hp Diesel	ZZZ-8120	750	38.58	926.03	24	365	0.53	0.30	0.29	0.01	18.02	0.48	--	4.13	--	2.32	1.32	1.29	0.04	78.94	2.10	--	18.11	--		
Starboard Drilling Crane: CAT 3412, 750 hp	RECIP.>600hp Diesel	ZZZ-8130	750	38.58	926.03	24	365	0.53	0.30	0.29	0.01	18.02	0.48	--	4.13	--	2.32	1.32	1.29	0.04	78.94	2.10	--	18.1			

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT										PHONE	REMARKS										
BP Exploration & Production Inc.	Mississippi Canyon	775, 776, 777, 778, 821, 822	OCS-G 09866, 0	Thunder Horse	778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009	Air Quality (Ramesh Gopal)/ Plans (D										Air Quality (409-655-4418)/ Plans (24	Actual fuel used for Black Lion, Black Hornet, W Auriga drillships										
OPERATIONS	EQUIPMENT	EQUIPMENT ID	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	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3		
DRILLING - Black Hornet (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage				13210																						
	Maximum Daily Fuel Usage				34818																						
	Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V	VESSELS- Drilling - Propulsion Engine - Diesel	60354	3104.97	34818.00	24	365	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	87.14	52.57	50.99	1.27	2087.71	60.03	0.01	327.45	0.61		
	Egen: Cummins 1900 kW	Vessels – Drilling Prime Engine, Auxiliary	2458	126.45	3034.90	2	53	1.73	1.05	1.01	0.03	41.55	1.19	0.00	6.52	0.01	0.09	0.06	0.05	0.00	2.20	0.06	0.00	0.35	0.00		
	Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	3086.76	24	365	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	7.73	4.66	4.52	0.11	185.08	5.32	0.00	29.03	0.05		
DRILLING - Black Lion (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage				16455																						
	Maximum Daily Fuel Usage				23326																						
	Main Engines: 6 x HIMSEN (6036 hp ea) + 2 x HIMSEN (12069	VESSELS- Drilling - Propulsion Engine - Diesel	60354	3104.97	23326.00	24	39	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	6.24	3.76	3.65	0.09	149.44	4.30	0.00	23.44	0.04		
	Egen: 1 x Cummins, 2548hp	Vessels – Drilling Prime Engine, Auxiliary	2548	131.08	3146.03	2	6	1.80	1.08	1.05	0.03	43.07	1.24	0.00	6.76	0.01	0.01	0.01	0.01	0.00	0.26	0.01	0.00	0.04	0.00		
	Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	3086.76	24	39	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.83	0.50	0.48	0.01	19.78	0.57	0.00	3.10	0.01		
DRILLING: West Auriga Drillship (Substitution likely with similar vessel of same/lower horsepower)	Average Daily Fuel Usage				9971																						
	Maximum Daily Fuel Usage				36288																						
	Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel	65262	3357.47	36288.00	24	39	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	9.70	5.85	5.68	0.14	232.49	6.68	0.00	36.47	0.07		
	E-Gen: 1 x Leroy Somer, 2145 hp	Vessels – Drilling Prime Engine, Auxiliary	2145	110.35	2648.44	2	6	1.51	0.91	0.89	0.02	36.26	1.04	0.00	5.69	0.01	0.01	0.01	0.01	0.00	0.22	0.01	0.00	0.03	0.00		
	Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	3086.76	24	39	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.83	0.50	0.48	0.01	19.78	0.57	0.00	3.10	0.01		
DRILLING - MODU TBD 1 (based on W Auriga) (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage																										
	Maximum Daily Fuel Usage																										
	Main Engines	VESSELS- Drilling - Propulsion Engine - Diesel	65262	3357.47	80579.25	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	201.66	121.67	118.02	2.94	4831.60	138.92	0.01	757.82	1.41		
	Egen	Vessels – Drilling Prime Engine, Auxiliary	2145	110.35	2648.44	2	53	1.51	0.91	0.89	0.02	36.26	1.04	0.00	5.69	0.01	0.08	0.05	0.05	0.00	1.92	0.06	0.00	0.30	0.00		
	Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	3086.76	24	365	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	7.73	4.66	4.52	0.11	185.08	5.32	0.00	29.03	0.05		
CONSTRUCTION / WELL INTERVENTION																											
CONSTRUCTION / INTERVENTION: Island Venture (Substitution likely with similar vessels of same or lower horsepower)					2923																						
					5711																						
	Main Engines: 4 x CAT C280-12	VESSELS -Construction/Intervention - Diesel	20384	1048.68	5711.00	24	238	14.38	8.68	8.42	0.21	344.54	9.91	0.00	54.04	0.10	9.32	5.62	5.45	0.14	223.29	6.42	0.00	35.02	0.07		
	Generators: 2 x CAT 280-8	VESSELS – Prime Engine, Auxiliary	6786	349.11	8378.70	24	238	4.79	2.89	2.80	0.07	114.70	3.30	0.00	17.99	0.03	13.67	8.25	8.00	0.20	327.59	9.42	0.00	51.38	0.10		
	Egen: 1 x CAT 3512	VESSELS – Prime Engine, Auxiliary	1920	98.78	2370.63	2	34	1.35	0.82	0.79	0.02	32.45	0.93	0.00	5.09	0.01	0.05	0.03	0.03	0.00	1.10	0.03	0.00	0.17	0.00		
	Temporary Large/ Small Auxiliary Engines	VESSELS – Prime Engine, Auxiliary	2500	128.62	3086.76	24	238	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	5.04	3.04	2.95	0.07	120.69	3.47	0.00	18.93	0.04		
CONSTRUCTION / INTERVENTION: Island Intervention (Substitution likely with similar vessels of same or lower horsepower)																											
	Main Engines/Power: 4 x Rolls Royce B32:40	VESSELS -Construction/Intervention - Diesel	19310	993.42	23842.13	24	140	13.62	8.22	7.97	0.20	326.39	9.38	0.00	51.19	0.10	22.89	13.81	13.39	0.33	548.34	15.77	0.00	86.01	0.16		
	Generator: 1 x 695kW	VESSELS – Prime Engine, Auxiliary	932	47.95	1150.74	2	140	0.66	0.40	0.38	0.01	15.75	0.45	0.00	2.47	0.00	0.09	0.06	0.05	0.00	2.21	0.06	0.00	0.35	0.00		
	Egen: 1 x 220kW	VESSELS – Prime Engine, Auxiliary	295	15.18	364.24	2	20	0.21	0.13	0.12	0.00	4.99	0.14	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.02	0.00		
	Temporary Large/ Small Auxiliary Engines	VESSELS – Prime Engine, Auxiliary	2500	128.62	3086.76	24	140	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.96	1.79	1.73	0.04	70.99	2.04	0.00	11.13	0.02		
CONSTRUCTION / INTERVENTION: C-Constructor (Substitution likely with similar vessels of same or lower horsepower)																											
	Main Engines: 6 x 1700 kW	VESSELS -Construction/Intervention - Diesel	13680	703.78	16890.75	24	78	9.65	5.82	5.65	0.14	231.23	6.65	0.00	36.27	0.07	9.03	5.45	5.29	0.13	216.43	6.22					

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL			CONTACT	PHONE	REMARKS																				
BP Exploration & Production Inc.	Mississippi Canyon	775, 776, 777, 778, 821, 822	OCS-G 09866, 0	Thunder Horse	778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, 7	Air Quality (Ramesh Gopal)/ Plans (4					Air Quality (409-655-4418)/ Plans (23										Actual fuel used for Black Lion, Black Hornet, W Auriga drillships									
OPERATIONS	EQUIPMENT	EQUIPMENT ID	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	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3					
DRILLING - Black Hornet (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage				13210																									
	Maximum Daily Fuel Usage				34818																									
	Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V	VESSELS- Drilling - Propulsion Engine - Diesel	60354	3104.97	34818.00	24	365	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	87.14	52.57	50.99	1.27	2087.71	60.03	0.01	327.45	0.61					
	Egen: Cummins 1900 kW	Vessels – Drilling Prime Engine, Auxiliary	2458	126.45	3034.90	2	53	1.73	1.05	1.01	0.03	41.55	1.19	0.00	6.52	0.01	0.09	0.06	0.05	0.00	2.20	0.06	0.00	0.35	0.00					
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	3086.76	24	365	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	7.73	4.66	4.52	0.11	185.08	5.32	0.00	29.03	0.05						
DRILLING - Black Lion (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage				16455																									
	Maximum Daily Fuel Usage				23326																									
	Main Engines: 6 x HIMSEN (6036 hp ea) + 2 x HIMSEN (12069 Egen: 1 x Cummins, 2548hp	VESSELS- Drilling - Propulsion Engine - Diesel	60354	3104.97	23326.00	24	117	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	18.71	11.29	10.95	0.27	448.33	12.89	0.00	70.32	0.13					
	Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2548	131.08	3146.03	2	17	1.80	1.08	1.05	0.03	43.07	1.24	0.00	6.76	0.01	0.03	0.02	0.02	0.00	0.73	0.02	0.00	0.11	0.00					
DRILLING: West Auriga Drillship (Substitution likely with similar vessel of same/lower horsepower)	Average Daily Fuel Usage				9971																									
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel			0.00	36288.00	24	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
E-Gen: 1 x Leroy Somer, 2145 hp	Vessels – Drilling Prime Engine, Auxiliary			0.00	0.00	2	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary			0.00	0.00	24	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
DRILLING - MODU TBD 1 (based on W Auriga) (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage																													
	Maximum Daily Fuel Usage																													
	Main Engines	VESSELS- Drilling - Propulsion Engine - Diesel	65262	3357.47	80579.25	24	45	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	24.86	15.00	14.55	0.36	595.68	17.13	0.00	93.43	0.17					
	Egen	Vessels – Drilling Prime Engine, Auxiliary	2145	110.35	2648.44	2	7	1.51	0.91	0.89	0.02	36.26	1.04	0.00	5.69	0.01	0.01	0.01	0.00	0.25	0.01	0.00	0.04	0.00	0.00					
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	3086.76	24	45	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.95	0.57	0.56	0.01	22.82	0.66	0.00	3.58	0.01						
CONSTRUCTION / WELL INTERVENTION																														
CONSTRUCTION / INTERVENTION: Island Venture (Substitution likely with similar vessels of same or lower horsepower)					2923																									
					5711																									
	Main Engines: 4 x CAT C280-12	VESSLS -Construction/Intervention - Diesel	20384	1048.68	5711.00	24	238	14.38	8.68	8.42	0.21	344.54	9.91	0.00	54.04	0.10	9.32	5.62	5.45	0.14	223.29	6.42	0.00	35.02	0.07					
	Generators: 2 x CAT 280-8	VESSLS – Prime Engine, Auxiliary	6786	349.11	8378.70	24	238	4.79	2.89	2.80	0.07	114.70	3.30	0.00	17.99	0.03	13.67	8.25	8.00	0.20	327.59	9.42	0.00	51.38	0.10					
Egen: 1 x CAT 3512	VESSLS – Prime Engine, Auxiliary	1920	98.78	2370.63	2	34	1.35	0.82	0.79	0.02	32.45	0.93	0.00	5.09	0.01	0.05	0.03	0.03	0.00	1.10	0.03	0.00	0.17	0.00						
Temporary Large/ Small Auxiliary Engines	VESSLS – Prime Engine, Auxiliary	2500	128.62	3086.76	24	238	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	5.04	3.04	2.95	0.07	120.69	3.47	0.00	18.93	0.04						
CONSTRUCTION / INTERVENTION: Island Intervention (Substitution likely with similar vessels of same or lower horsepower)																														
	Main Engines/Power: 4 x Rolls Royce B32:40	VESSLS -Construction/Intervention - Diesel	19310	993.42	23842.13	24	140	13.62	8.22	7.97	0.20	326.39	9.38	0.00	51.19	0.10	22.89	13.81	13.39	0.33	548.34	15.77	0.00	86.01	0.16					
	Generator: 1 x 695kW	VESSLS – Prime Engine, Auxiliary	932	47.95	1150.74	2	140	0.66	0.40	0.38	0.01	15.75	0.45	0.00	2.47	0.00	0.09	0.06	0.05	0.00	2.21	0.06	0.00	0.35	0.00					
Egen: 1 x 220kW	VESSLS – Prime Engine, Auxiliary	295	15.18	364.24	2	20	0.21	0.13	0.12	0.00	4.99	0.14	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.02	0.00						
Temporary Large/ Small Auxiliary Engines	VESSLS – Prime Engine, Auxiliary	2500	128.62	3086.76	24	140	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.96	1.79	1.73	0.04	70.99	2.04	0.00	11.13	0.02						
CONSTRUCTION / INTERVENTION: C-Constructor (Substitution likely with similar vessels of same or lower horsepower)																														
	Main Engines: 6 x 1700 kW	VESSLS -Construction/Intervention - Diesel	13680	703.78	16890.75	24	78	9.65	5.82	5.65	0.14	231.23	6.65	0.00	36.27	0.07	9.03	5.45	5.29	0.13	216.43	6.22	0.00	33.95	0.06					
	Egen: 1 x 425 kW	VESSLS – Prime Engine, Auxiliary	570	29.32	703.78	2	12	0.40	0.24	0.24	0.01	9.63	0.28	0.00	1.51	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.02	0.00					
Temporary Large/ Small Auxiliary Engines	VESSLS – Prime Engine, Auxiliary	2500	128.62	3086.76	24	78	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	1.65	1.00	0.97	0.02	39.55	1.14	0.00	6.20	0.0						

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COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS															
BP Exploration & Production Inc.	Mississippi Canyon		775, 776, 777, 778, 821, 822	OCS-G 09866, 0	Thunder Horse	778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009	Air Quality (Ramesh Gopal)/ Plans (1) Air Quality (409-655-4418)/ Plans (2) Actual fuel used for Black Lion, Black Hornet, W Auriga drillships																				
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR								ESTIMATED TONS											
	Diesel Engines		HP	GAL/HHR	GAL/D																						
	Nat. Gas Engines		HP	SCF/HHR	SCF/D																						
	Burners		MMBTU/HR	SCF/HHR	SCF/D	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3		
DRILLING - Black Hornet (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage				13210																						
	Maximum Daily Fuel Usage				34818																						
	Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V	VESSELS- Drilling - Propulsion Engine - Diesel	60354	3104.97	3104.97	34818.00	24	365	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	87.14	52.57	50.99	1.27	2087.71	60.03	0.01	327.45	0.61	
	Egen: Cummins 1900 kW	Vessels – Drilling Prime Engine, Auxiliary	2458	126.45	126.45	3034.90	2	53	1.73	1.05	1.01	0.03	41.55	1.19	0.00	6.52	0.01	0.09	0.06	0.05	0.00	2.20	0.06	0.00	0.35	0.00	
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	128.62	3086.76	24	365	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	7.73	4.66	4.52	0.11	185.08	5.32	0.00	29.03	0.05		
DRILLING - Black Lion (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage				16455																						
	Maximum Daily Fuel Usage				23326																						
	Main Engines: 6 x HIMSEN (6036 hp ea) + 2 x HIMSEN (12069	VESSELS- Drilling - Propulsion Engine - Diesel	60354	3104.97	3104.97	23326.00	24	39	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	6.24	3.76	3.65	0.09	149.44	4.30	0.00	23.44	0.04	
	Egen: 1 x Cummins, 2548hp	Vessels – Drilling Prime Engine, Auxiliary	2548	131.08	131.08	3146.03	2	6	1.80	1.08	1.05	0.03	43.07	1.24	0.00	6.76	0.01	0.01	0.01	0.01	0.00	0.26	0.01	0.00	0.04	0.00	
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	128.62	3086.76	24	39	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.83	0.50	0.48	0.01	19.78	0.57	0.00	3.10	0.01		
DRILLING: West Auriga Drillship (Substitution likely with similar vessel of same/lower horsepower)	Average Daily Fuel Usage				9971																						
	Maximum Daily Fuel Usage				36288																						
	Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		0.00	36288.00	24	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	E-Gen: 1 x Leroy Somer, 2145 hp	Vessels – Drilling Prime Engine, Auxiliary		0.00	0.00	2	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary		0.00	0.00	24	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
DRILLING - MODU TBD 1 (based on W Auriga) (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage																										
	Maximum Daily Fuel Usage																										
	Main Engines	VESSELS- Drilling - Propulsion Engine - Diesel	65262	3357.47	3357.47	80579.25	24	117	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	64.64	39.00	37.83	0.94	1548.76	44.53	0.00	242.92	0.45	
	Egen	Vessels – Drilling Prime Engine, Auxiliary	2145	110.35	110.35	2648.44	2	17	1.51	0.91	0.89	0.02	36.26	1.04	0.00	5.69	0.01	0.03	0.02	0.02	0.00	0.62	0.02	0.00	0.10	0.00	
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary	2500	128.62	128.62	3086.76	24	117	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.48	1.49	1.45	0.04	59.33	1.71	0.00	9.31	0.02		
CONSTRUCTION / WELL INTERVENTION																											
CONSTRUCTION / INTERVENTION: Island Venture (Substitution likely with similar vessels of same or lower horsepower)					2923																						
					5711																						
	Main Engines: 4 x CAT C280-12	VESSELS -Construction/Intervention - Diesel	20384	1048.68	1048.68	5711.00	24	238	14.38	8.68	8.42	0.21	344.54	9.91	0.00	54.04	0.10	9.32	5.62	5.45	0.14	223.29	6.42	0.00	35.02	0.07	
	Generators: 2 x CAT 280-8	VESSELS – Prime Engine, Auxiliary	6786	349.11	349.11	8378.70	24	238	4.79	2.89	2.80	0.07	114.70	3.30	0.00	17.99	0.03	13.67	8.25	8.00	0.20	327.59	9.42	0.00	51.38	0.10	
Egen: 1 x CAT 3512	VESSELS – Prime Engine, Auxiliary	1920	98.78	98.78	2370.63	2	34	1.35	0.82	0.79	0.02	32.45	0.93	0.00	5.09	0.01	0.05	0.03	0.03	0.00	1.10	0.03	0.00	0.17	0.00		
Temporary Large/ Small Auxiliary Engines	VESSELS – Prime Engine, Auxiliary	2500	128.62	128.62	3086.76	24	238	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	5.04	3.04	2.95	0.07	120.69	3.47	0.00	18.93	0.04		
CONSTRUCTION / INTERVENTION: Island Intervention (Substitution likely with similar vessels of same or lower horsepower)																											
	Main Engines/Power: 4 x Rolls Royce B32:40	VESSELS -Construction/Intervention - Diesel	19310	993.42	993.42	23842.13	24	140	13.62	8.22	7.97	0.20	326.39	9.38	0.00	51.19	0.10	22.89	13.81	13.39	0.33	548.34	15.77	0.00	86.01	0.16	
	Generator: 1 x 695kW	VESSELS – Prime Engine, Auxiliary	932	47.95	47.95	1150.74	2	140	0.66	0.40	0.38	0.01	15.75	0.45													

COMPANY		AREA		BLOCK		LEASE		FACILITY		WELL				CONTACT		PHONE		REMARKS																																	
BP Exploration & Production Inc.		Mississippi Canyon		775, 776, 777, 778, 821, 822		OCS-G 09866, C		Thunder Horse		778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009				Air Quality (Ramesh Copal)/ Plans (3)		Air Quality (409-655-4418)/ Plans (2)		Actual fuel used for Black Lion, Black Hornet, W Auriga drillships																																	
OPERATIONS		EQUIPMENT		EQUIPMENT ID		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 D/YR		TSP		PM10		PM2.5		SOx		NOx		VOC		Pb		CO		NH3		TSP		PM10		PM2.5		SOx		NOx		VOC		Pb		CO		NH3			
DRILLING - Black Hornet (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)		Average Daily Fuel Usage								13210																																									
		Maximum Daily Fuel Usage								34818																																									
		Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V		VESSELS- Drilling - Propulsion Engine - Diesel		60354		3104.97		34818.00		24		365		42.58		25.69		24.92		0.62		1020.15		29.33		0.00		160.01		0.30		87.14		52.57		50.99		1.27		2087.71		60.03		0.01		327.45		0.61	
		Egen: Cummins 1900 kW		Vessels – Drilling Prime Engine, Auxiliary		2458		126.45		3034.90		2		53		1.73		1.05		1.01		0.03		41.55		1.19		0.00		6.52		0.01		0.09		0.06		0.05		0.00		2.20		0.06		0.00		0.35		0.00	
Temporary Large/ Small Auxiliary Engines		Vessels – Drilling Prime Engine, Auxiliary		2500		128.62		3086.76		24		365		1.76		1.06		1.03		0.03		42.26		1.21		0.00		6.63		0.01		7.73		4.66		4.52		0.11		185.08		5.32		0.00		29.03		0.05			
DRILLING - Black Lion (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)		Average Daily Fuel Usage								16455																																									
		Maximum Daily Fuel Usage								23326																																									
		Main Engines: 6 x HIMSEN (6036 hp ea) + 2 x HIMSEN (12069		VESSELS- Drilling - Propulsion Engine - Diesel		60354		3104.97		23326.00		24		39		42.58		25.69		24.92		0.62		1020.15		29.33		0.00		160.01		0.30		6.24		3.76		3.65		0.09		149.44		4.30		0.00		23.44		0.04	
		Egen: 1 x Cummins, 2548hp		Vessels – Drilling Prime Engine, Auxiliary		2548		131.08		3146.03		2		6		1.80		1.08		1.05		0.03		43.07		1.24		0.00		6.76		0.01		0.01		0.01		0.00		0.26		0.01		0.00		0.04		0.00			
Temporary Large/ Small Auxiliary Engines		Vessels – Drilling Prime Engine, Auxiliary		2500		128.62		3086.76		24		39		1.76		1.06		1.03		0.03		42.26		1.21		0.00		6.63		0.01		0.83		0.50		0.48		0.01		19.78		0.57		0.00		3.10		0.01			
DRILLING: West Auriga Drillship (Substitution likely with similar vessel of same/lower horsepower)		Average Daily Fuel Usage								9971																																									
		Maximum Daily Fuel Usage								36288																																									
		Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.		VESSELS- Drilling - Propulsion Engine - Diesel				0.00		36288.00		24		0		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00					
		E-Gen: 1 x Leroy Somer, 2145 hp		Vessels – Drilling Prime Engine, Auxiliary				0.00		0.00		2		0		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00					
Temporary Large/ Small Auxiliary Engines		Vessels – Drilling Prime Engine, Auxiliary				0.00		0.00		24		0		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00					
DRILLING - MODU TBD 1, (based on W Auriga) (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)		Average Daily Fuel Usage																																																	
		Maximum Daily Fuel Usage																																																	
		Main Engines		VESSELS- Drilling - Propulsion Engine - Diesel		65262		3357.47		80579.25		24		117		46.04		27.78		26.94		0.67		1103.10		31.72		0.00		173.02		0.32		64.64		39.00		37.83		0.94		1548.76		44.53		0.00		242.92		0.45	
		Egen		Vessels – Drilling Prime Engine, Auxiliary		2145		110.35		2648.44		2		17		1.51		0.91		0.89		0.02		36.26		1.04		0.00		5.69		0.01		0.03		0.02		0.02		0.00		0.62		0.02		0.00		0.10		0.00	
Temporary Large/ Small Auxiliary Engines		Vessels – Drilling Prime Engine, Auxiliary		2500		128.62		3086.76		24		117		1.76		1.06		1.03		0.03		42.26		1.21		0.00		6.63		0.01		2.48		1.49		1.45		0.04		59.33		1.71		0.00		9.31		0.02			
CONSTRUCTION / WELL INTERVENTION																																																			
CONSTRUCTION / INTERVENTION: Island Venture (Substitution likely with similar vessels of same or lower horsepower)										2923																																									
										5711																																									
		Main Engines: 4 x CAT C280-12		VESSELS -Construction/Intervention - Diesel		20384		1048.68		5711.00		24		238		14.38		8.68		8.42		0.21		344.54		9.91		0.00		54.04		0.10		9.32		5.62		5.45		0.14		223.29		6.42		0.00		35.02		0.07	
		Generators: 2 x CAT 280-8		VESSELS – Prime Engine, Auxiliary		6786		349.11		8378.70		24		238		4.79		2.89		2.80		0.07		114.70		3.30		0.00		17.99		0.03		13.67		8.25		8.00		0.20		327.59		9.42		0.00		51.38		0.10	
Egen: 1 x CAT 3512		VESSELS – Prime Engine, Auxiliary		1920		98.78		2370.63		2		34		1.35		0.82		0.79		0.02		32.45		0.93		0.00		5.09		0.01		0.05		0.03		0.03		0.00		1.10		0.03		0.00		0.17		0.00			
Temporary Large/ Small Auxiliary Engines		VESSELS – Prime Engine, Auxiliary		2500		128.62		3086.76		24		238		1.76		1.06		1.03		0.03		42.26		1.21		0.00		6.63		0.01		5.04		3.04		2.95		0.07		120.69		3.47		0.00		18.93		0.04			
CONSTRUCTION / INTERVENTION: Island Intervention (Substitution likely with similar vessels of same or lower horsepower)																																																			
		Main Engines/Power: 4 x Rolls Royce B32-40		VESSELS -Construction/Intervention - Diesel		19310		993.42		23842.13		24		140		13.62		8.22		7.97		0.20		326.39		9.38		0.00		51.19		0.10		22.89		13.81		13.39		0.33		548.34		15.77		0.00		86.01		0.16	
		Generator: 1 x 695kW		VESSELS – Prime Engine, Auxiliary		932		47.95		1150.74		2		140		0.66		0.40		0.38		0.01		15.75		0.45		0.00		2.47		0.00		0.09		0.06		0.05		0.00		2.21		0.06		0.00		0.35		0.00	
Egen: 1 x 220kW		VESSELS – Prime Engine, Auxiliary		295		15.18		364.24		2		20		0.21		0.13		0.12		0.00		4.99		0.14		0.00		0.78		0.00		0.00		0.00		0.00		0.00		0.10		0.00		0.00		0.02		0.00			
Temporary Large/ Small Auxiliary Engines		VESSELS – Prime Engine, Auxiliary		2500		128.62		3086.76		24		140		1.76		1.06		1.03		0.03		42.26		1.21		0.00		6.63		0.01		2.96		1.79		1.73		0.04		70.99		2.04		0.00		11.13		0.02			
CONSTRUCTION / INTERVENTION: C-Constructor (Substitution likely with similar vessels of same or lower horsepower)																																																			
		Main Engines: 6 x 1700 kW		VESSELS -Construction/Intervention - Diesel		13680		703.78		16890.75		24		78		9.65		5.82		5.65		0.14		231.23		6.65		0.00		36.27		0.07		9.03		5.45		5.29		0.13		216.43		6.22		0.00		33.95		0.06	
		Egen: 1 x 425 kW		VESSELS – Prime Engine, Auxiliary		570		29.32		703.78		2		12		0.40		0.24		0.24		0.01		9.63		0.28		0.00		1.51		0.00		0.00		0.00		0.00		0.00		0.12		0.00		0.00		0.02		0.00	
Temporary Large/ Small Auxiliary Engines		VESSELS – Prime Engine, Auxiliary		2500		128.62		3086.76		24		78		1.76		1.06		1.03		0.03		42.26		1.21		0.00		6.63		0.01		1.65		1.00		0.97		0.02		39.55		1.14		0.00		6.20		0.01			
CONSTRUCTION / INTERVENTION: MV Holiday (Substitution likely with similar vessels of same or lower horsepower)																																																			
		Main Engines: 2 x Cat C280-16		VESSELS -Construction/Intervention - Diesel		18800		967.18		23212.44		24		60		13.26		8.00		7.76		0.19		317.77		9.14		0.00		49.84		0.09		9.55		5.76		5.59		0.14		228.79		6.58		0.00		35.89		0.07	
		Generators: 5 x 910kW		VESSELS – Prime Engine, Auxiliary		6100		313.82		7531.69		24		60		4.30		2.60		2.52		0.06		103.11		2.96		0.00		16.17		0.03		3.10		1.87		1.81		0.05		74.24		2.13		0.00		11.64		0.02	
Egen: 1 x 250 kW		VESSELS – Prime Engine, Auxiliary		335		17.23		413.63		2		9		0.24																																					

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS															
BP Exploration & Production Inc.	Mississippi Canyon		775, 776, 777, 778, 821, 822	OCS-G 09866, 0	Thunder Horse	778-008, 778-019, 778-020,	TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009	Air Quality (Ramesh Gopal)/ Plans (1) Air Quality (409-655-4418)/ Plans (2) Actual fuel used for Black Lion, Black Hornet, W Auriga drillships																			
OPERATIONS	EQUIPMENT	EQUIPMENT ID	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	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3		
DRILLING - Black Hornet (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage Maximum Daily Fuel Usage				13210 34818																						
Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V Egen: Cummins 1900 kW Temporary Large/ Small Auxiliary Engines	VESSELS- Drilling - Propulsion Engine - Diesel Vessels – Drilling Prime Engine, Auxiliary Vessels – Drilling Prime Engine, Auxiliary		60354 2458 2500	3104.97 126.45 128.62	34818.00 3034.90 3086.76	24 2 24	365 53 365	42.58 1.73 1.76	25.69 1.05 1.06	24.92 1.01 1.03	0.62 0.03 0.03	1020.15 41.55 42.26	29.33 1.19 1.21	0.00 0.00 0.00	160.01 6.52 6.63	0.30 0.01 0.01	87.14 0.09 7.73	52.57 0.06 4.66	50.99 0.05 4.52	1.27 0.00 0.11	2087.71 2.20 185.08	60.03 0.06 5.32	0.01 0.00 0.00	327.45 0.35 29.03	0.61 0.00 0.05		
DRILLING - Black Lion (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage Maximum Daily Fuel Usage				16455 23326																						
Main Engines: 6 x HIMSEN (6036 hp ea) + 2 x HIMSEN (12069 Egen: 1 x Cummins, 2548hp Temporary Large/ Small Auxiliary Engines	VESSELS- Drilling - Propulsion Engine - Diesel Vessels – Drilling Prime Engine, Auxiliary Vessels – Drilling Prime Engine, Auxiliary		60354 2548 2500	3104.97 131.08 128.62	23326.00 3146.03 3086.76	24 2 24	39 6 39	42.58 1.80 1.76	25.69 1.08 1.06	24.92 1.05 1.03	0.62 0.03 0.03	1020.15 43.07 42.26	29.33 1.24 1.21	0.00 0.00 0.00	160.01 6.76 6.63	0.30 0.01 0.01	6.24 0.01 0.83	3.76 0.01 0.50	3.65 0.01 0.48	0.09 0.00 0.01	149.44 0.26 19.78	4.30 0.01 0.57	0.00 0.00 0.00	23.44 0.04 3.10	0.04 0.00 0.01		
DRILLING: West Auriga Drillship (Substitution likely with similar vessel of same/ lower horsepower)	Average Daily Fuel Usage Maximum Daily Fuel Usage				9971 36288																						
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea. E-Gent: 1 x Leroy Somer, 2145 hp Temporary Large/ Small Auxiliary Engines	VESSELS- Drilling - Propulsion Engine - Diesel Vessels – Drilling Prime Engine, Auxiliary Vessels – Drilling Prime Engine, Auxiliary			0.00 0.00 0.00	36288.00 0.00 0.00	24 2 24	0 0 0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00			
DRILLING - MODU TBD 1 (based on W Auriga) (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage Maximum Daily Fuel Usage																										
Main Engines Egen Temporary Large/ Small Auxiliary Engines	VESSELS- Drilling - Propulsion Engine - Diesel Vessels – Drilling Prime Engine, Auxiliary Vessels – Drilling Prime Engine, Auxiliary		65262 2145 2500	3357.47 110.35 128.62	80579.25 2648.44 3086.76	24 2 24	117 17 117	46.04 1.51 1.76	27.78 0.91 1.06	26.94 0.89 1.03	0.67 0.02 0.03	1103.10 36.26 42.26	31.72 1.04 1.21	0.00 0.00 0.00	173.02 5.69 6.63	0.32 0.01 0.01	64.64 0.03 2.48	39.00 0.02 1.49	37.83 0.02 1.45	0.94 0.00 0.04	1548.76 0.62 59.33	44.53 0.02 1.71	0.00 0.00 0.00	242.92 0.10 9.31	0.45 0.00 0.02		
CONSTRUCTION / WELL INTERVENTION																											
CONSTRUCTION / INTERVENTION: Island Venture (Substitution likely with similar vessels of same or lower horsepower)					2923 5711																						
Main Engines: 4 x CAT C280-12 Generators: 2 x CAT 280-8 Egen: 1 x CAT 3512 Temporary Large/ Small Auxiliary Engines	VESSELS -Construction/Intervention - Diesel VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary		20384 6786 1920 2500	1048.68 349.11 98.78 128.62	5711.00 8378.70 2370.63 3086.76	24 24 2 24	238 238 34 238	14.38 4.79 1.35 1.76	8.68 2.89 0.82 1.06	8.42 2.80 0.79 1.03	0.21 0.07 0.02 0.03	344.54 114.70 32.45 42.26	9.91 3.30 0.93 1.21	0.00 0.00 0.00 0.00	54.04 17.99 5.09 6.63	0.10 0.03 0.01 0.01	9.32 13.67 0.05 5.04	5.62 8.25 0.03 3.04	5.45 8.00 0.03 2.95	0.14 0.20 0.00 0.07	223.29 327.59 1.10 120.69	6.42 9.42 0.03 3.47	0.00 0.00 0.00 0.00	35.02 51.38 0.17 18.93	0.07 0.10 0.00 0.04		
CONSTRUCTION / INTERVENTION: Island Intervention (Substitution likely with similar vessels of same or lower horsepower)																											
Main Engines/Power: 4 x Rolls Royce B32-40 Generator: 1 x 695kW Egen: 1 x 220kW Temporary Large/ Small Auxiliary Engines	VESSELS -Construction/Intervention - Diesel VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary		19310 932 295 2500	993.42 47.95 15.18 128.62	23842.13 1150.74 364.24 3086.76	24 2 2 24	140 140 20 140	13.62 0.66 0.21 1.76	8.22 0.40 0.13 1.06	7.97 0.38 0.12 1.03	0.20 0.01 0.00 0.03	326.39 15.75 4.99 42.26	9.38 0.45 0.14 1.21	0.00 0.00 0.00 0.00	51.19 2.47 0.78 6.63	0.10 0.00 0.00 0.01	22.89 0.09 0.00 2.96	13.81 0.06 0.00 1.79	13.39 0.05 0.00 1.73	0.33 0.00 0.00 0.04	548.34 2.21 0.10 70.99	15.77 0.06 0.00 2.04	0.00 0.00 0.00 0.00	86.01 0.35 0.02 11.13	0.16 0.00 0.00 0.02		
CONSTRUCTION / INTERVENTION: C-Constructor (Substitution likely with similar vessels of same or lower horsepower)																											
Main Engines: 6 x 1700 kW Egen: 1 x 425 kW Temporary Large/ Small Auxiliary Engines	VESSELS -Construction/Intervention - Diesel VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary		13680 570 2500	703.78 29.32 128.62	16890.75 703.78 3086.76	24 2 24	78 12 78	9.65 0.40 1.76	5.82 0.24 1.06	5.65 0.24 1.03	0.14 0.01 0.03	231.23 9.63 42.26	6.65 0.28 1.21	0.00 0.00 0.00	36.27 1.51 6.63	0.07 0.00 0.01	9.03 0.00 1.65	5.45 0.00 1.00	5.29 0.00 0.97	0.13 0.00 0.02	216.43 0.12 39.55	6.22 0.00 1.14	0.00 0.00 0.00	33.95 0.02 6.20	0.06 0.00 0.01		
CONSTRUCTION / INTERVENTION: MV Holiday (Substitution likely with similar vessels of same or lower horsepower)																											
Main Engines: 2 x Cat C280-16 Generators: 5 x 910kW Egen: 1 x 250 kW Temporary Large/ Small Auxiliary Engines	VESSELS -Construction/Intervention - Diesel VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary VESSELS – Prime Engine, Auxiliary		18800 6100 335 2500	967.18 313.82 17.23 128.62	23212.44 7531.69 413.63 3086.76	24 24 2 24	60 60 9 60	13.26 4.30 0.24 1.76	8.00 2.60 0.14 1.06	7.76 2.52 0.14 1.03	0.19 0.06 0.00 0.03	317.77 103.11 52.66 4.26	9.14 2.96 0.16 1.21	0.00 0.00 0.00 0.00	49.84 16.17 0.89 6.63	0.09 0.03 0.00 0.01	9.55 3.10 0.00 1.27	5.76 1.87 0.00 0.77	5.59 1.81 0.00 0.74	0.14 0.05 0.00 0.02	228.79 74.24 0.05 30.42	6.58 2.13 0.00 0.87	0.00 0.00 0.00 0.00	35.89 11.64 0.01 4.77	0.07 0.02 0.00 0.01		
PRODUCTION																											
Production Aft Crane - CAT 3408, 525 hp Compressor Module Crane, CAT 3408, 525 hp Hurricane Generator, CAT 3306TA, 382 hp RGB Compressor, Cummins QSB6.7, 260 hp RGB UHP Water Blaster, CAT C-9 Husky, 290 hp Welding Machines: 4 x 68.4 hp, Lincoln TEMP: Small/ Large Auxiliary Engines (various hp) Fast Rescue Craft - YANMAR 6LPA, 212 hp Lifeboats: 8 x 36 hp SAAB LS4 Turbine Compressor 1: GE LM2500, 30575 hp, diesel Turbine Compressor 2: GE LM2500, 30575 hp, diesel Turbine Compressor 3: GE LM2500, 30575 hp, diesel Turbine Compressor 4: GE LM2500, 30575 hp, diesel Turbine Compressor 5: GE LM2500, 30575 hp, diesel Auxiliary Generator 1: Wartsila 18V26, 7188 hp Auxiliary Generator 2: Wartsila 18V26, 7188 hp Emergency Generator: Wartsila 12V200, 2816 hp Fire Water Pump C: Wartsila 6L20, 1368 hp Fire Water Pump D: Wartsila 6L20, 1368 hp Port Drilling Crane: CAT 3412, 750 hp Starboard Drilling Crane: CAT 3412, 750 hp Turbine Compressor 1: GE LM2500, 30575 hp, Gas Turbine Compressor 2: GE LM2500, 30575 hp, Gas Turbine Compressor 3: GE LM2500, 30575 hp, Gas Turbine Compressor 4: GE LM2500, 30575 hp, Gas Turbine Compressor 5: GE LM2500, 30575 hp, Gas	RECIP.<600hp Diesel RECIP.<600hp Diesel RECIP.<600hp Diesel RECIP.<600hp Diesel RECIP.<600hp Diesel RECIP.<600hp Diesel RECIP.<600hp Diesel RECIP.<600hp Diesel Dual Fuel Turbine Dual Fuel Turbine Dual Fuel Turbine Dual Fuel Turbine Dual Fuel Turbine Dual Fuel Turbine RECIP.>600hp Diesel RECIP.>600hp Diesel RECIP.>600hp Diesel RECIP.>600hp Diesel RECIP.>600hp Diesel RECIP.>600hp Diesel Dual Fuel Turbine Dual Fuel Turbine Dual Fuel Turbine Dual Fuel Turbine Dual Fuel Turbine RECIP.>600hp Diesel RECIP.>600hp Diesel RECIP.>600hp Diesel RECIP.>600hp Diesel RECIP.>600hp Diesel RECIP.>600hp Diesel Natural Gas Turbine Natural Gas Turbine Natural Gas Turbine Natural Gas Turbine Natural Gas Turbine	ZZZ-8100 ZZZ-8110 ZAN-5900 																									

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL
BP Exploration & Production Inc.	Mississippi Canyon	775, 776, 777, 778, 821, 822	OCS-G 09866, 09867, 09868, 14657, 14658, 19997	Thunder Horse	778-008, 778-019, 778-020, TA011, TA001, TA002, TA003, TA004, TA005, TA006, TA007, TA008, TA009, TA010, TB001, TB003, TC002, TC003, TD001, TD002, TD003, TD004, TF001, TF002, TG001, TG002, TG003, TG004, TI001, TH001, TH002, TJ001, TK001, TK002, 002 ST01BP00, 004 ST01BP00, 777-007, 822-6, 822-1, 777-1 Future Wells: 778WIXi-1, SPc1W, SPc3W, SB21(822-20), NPi15 (777-10 S-8090), SPc12 (822-23), SPi7 (778-13), SPi4W (778-7), SPc5 (822-24), SPi5W (778-14), SPi5 (778-16), NPc (777-2), NBr2 (776-10"AB" N-7469), NPi21 (775-4"BG" S-7868), SB10 (822-19), SB17 (822-21)

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2023	331.95	224.16	219.26	10.92	10727.57	1473.20	0.03	2485.41	1.65
2024	497.04	323.77	315.87	13.33	14683.01	1586.93	0.04	3105.81	2.80
2025	317.01	215.15	210.51	10.71	10369.59	1462.91	0.02	2429.26	1.54
2026	319.38	216.58	211.90	10.74	10426.27	1464.54	0.02	2438.15	1.56
2027	273.48	188.88	185.04	10.07	9326.56	1432.92	0.02	2265.66	1.24
2028	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2029	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2030	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2031	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
2032	344.18	231.54	226.42	11.10	11020.63	1481.63	0.03	2531.37	1.73
Allowable	2131.20			2131.20	2131.20	2131.20		54400.00	



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Appendix F: Worst Case Discharge (WCD) Modeling

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 37 of 39
Uncontrolled when printed or stored locally			

Appendix F: Worst Case Discharge (WCD) Modeling

**Supplemental
Development Operations Coordination Document
Thunder Horse
Subsea Pump Project**

Worst Case Discharge

The activities proposed in the Thunder Horse Subsea Pump Project have been assessed for their WCD potential. These activities in Thunder Horse lease Mississippi Canyon Block 778 do not exceed the worst-case discharge of the Blowout Scenario that was described in the Revised DOCD R-6681, which was approved on June 29, 2018. A copy of the WCD Modeling report from the Revised DOCD R-6681 is provided in the Proprietary copy of this DOCD.

Appendix G: Oil Spill Response Discussion

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
Authority:	Kevin Stanley	Revision	0
Custodian/Owner:	Amanda Phythian	Issue Date:	April 2023
Retention Code:	ADM3000	Next Review Date (if applicable):	n/ a
Security Classification:	BP Internal	Page:	Page 38 of 39
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Oil Spill Response Discussion for MC 778

1) Worst Case Discharge Scenario - Previously approved in DOCD S-8090; No change for this DOCD

Under this Supplemental Development Operations Controlled Document, BP Exploration & Production Inc. (BP) proposes to drill and complete a well in Drill Center 34 in the North area of the Thunder Horse field in Mississippi Canyon, Block 777 using a drilling MODU.

The well does not result in a change to the worst-case oil spill scenario described in the revised DOCD (R-06681), approved on June 29, 2018. The worst-case oil spill scenario described in DOCD R-06681 is based upon an uncontrolled blowout with a discharge rate determined in accordance with 30 CFR 254.47(b). Pursuant to 30 CFR 254.30(b), on (July 12, 2022) bp submitted to BSEE a revision to the Oil Spill Response Plan referenced above. Revision changes are listed in the Record of Revision Form (Figure 2-1) of the revised OSRP.

The uncontrolled blowout scenario is for a potential blowout of the MC778 (Planning Name SB2); well name was changed to MC822-016 with APD for drill to TD) development well which BP calculates has the highest liquid hydrocarbons rate potential in the Thunder Horse Project area. 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. On Day 1, the worst-case discharge is approximately 360,000 bopd. The maximum duration of the blowout is estimated at 90-days. The rate profile associated with the well blowout results in a discharge rate approximately at 150,000 bbls on day 90.

The data and information presented in the following sections 2) – 6) of this Oil Spill Discussion relate to the MC778-15 (Planning Name SB2), which BP believes to be analogous to the well that is covered under this Supplemental DOCD for MC 777.

2) Facility Information

- Type of Operation: Subsea Well Development
- Facility Name: Surface Hole 778
- Area and Block: MC 778
- Latitude: 28° 11' 26.524" N
- Longitude: 88° 29' 45.946" W
- Distance to Shore: 68 statute miles
- Water Depth: Approximately 6,030 feet
- API Gravity: 32°
- Maximum tank and flowline capacity: 42,000 + 8,000 barrels
- Estimated Volume released due to facility pipeline break: 13,000 barrels
- Daily Production Volume: 360,000 barrels

3) Worst Case Discharge Volume

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 14% or approximately 59,220 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 363,780 barrels remaining. A description of the response equipment to contain and recover the Worst Case Discharge is shown in the status boards further down below. It identifies the Oil Spill Response Organisation's equipment, personnel, materials and support vessels as well as temporary storage equipment to respond to the worst case discharge.

Criteria	Barrels
Maximum tank and flowline capacity	50,000
Estimated volume released due to facility pipeline break	13,000
Estimated daily production volume	360,000
TOTAL WORST CASE DISCHARGE	423,000
Loss of volume of oil due to natural surface dispersion and evaporation based on ADIOS 2 Model calculations (approximate) (14% Evaporation and no natural dispersion in 24-hours)	-59,220
TOTAL WORST CASE DISCHARGE	363,780

4) Land Segment Identification

In compliance with NTL 2012-N06, BP has determined the land areas that could be potentially impacted by a potential MC 778 oil spill using the BOEM Oil Spill Risk Analysis Model (OSRAM) trajectory results for the Central and Western Gulf of Mexico available on the BOEM website. The OSRAM estimates the probability that oil spills from designated locations would contact shoreline and offshore natural resources. Whether and where a particular spill would reach shore is dependent on various factors, such as weather, currents and product characteristics and, as a result, actual oil movement in the event of a spill may vary from the OSRAM results. These probabilities are intended to indicate, in terms of percentage, the computed likelihood that an oil spill occurring in a particular launch area will contact a certain county or parish within 3, 10, and 30 days.

OCS Launch Block #59 was utilized as the MC 778 point of origin. Land segments identified by the model are listed below (referenced from "Oil-Spill Risk Analysis: Contingency Planning Statistics for Gulf of Mexico OCS Activities" – OCS Report MMS 2004-026):

4) Land Segment Identification (Cont'd)

Area and Spill Site	Land Segment Contact	Conditional Probability ¹ (%)		
		3	10	30
Mississippi Canyon 778 Launch Block #59	Land Segment No. & County/ Parish & State	3	10	30
	Cameron, LA	--	--	1
	Vermilion, LA	--	--	1
	Terrebonne, LA	--	--	2
	Lafourche, LA	--	1	2
	Jefferson, LA	--	--	1
	Plaquemines, LA	--	5	11
	St. Bernard, LA	--	--	2
	Walton, FL	--	--	1
	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%).

5) Resource Identification

The land segment that has the highest computed probability of being impacted by a release from MC 778-15 within 30 days is **Plaquemines, Louisiana at 11 percent**. Sources which may be used to identify the sensitive resources located in Plaquemines, LA and the other land segments identified in the table above can be identified in the OSRP, **Section 12**. Resources that may be impacted in Plaquemines, Louisiana include, without limitation, those shown in Figure 5-1.

Figure 5-1 – Environmental Sensitivities & Socioeconomic Resources for Plaquemines Parish, Louisiana

Sensitive Area:	Delta National Wildlife Refuge
Habitat:	48,800 acres of marsh, wetlands, open water, shallow ponds, channels and bayous provides a habitat for migratory birds, a multitude of fish and wildlife species, and serve as a nursery for the rich aquatic resources of the region.
Wildlife:	Waterfowl: Winter residents include mallards, northern shovelers, northern pintail, wigeon, gadwall, redheads, ringnecks, scaup, megangers, American widgeon, bufflehead, mottled ducks, blue and green-winged teal, coots, canvasbacks, and Canada snow, white-fronted, and Ross' geese. Shorebirds: Commonly observed species include greater and lesser yellowlegs, long-billed dowitchers, dunlins, least and western sandpipers, avocets, black-necked stilts, American oystercatchers, ruddy turnstones, Wilson's plovers, killdeer and willets. Wading Birds: Cranes, herons, egrets, roseate spoonbills, and ibises. Fish and Marine Life: Speckled trout, redfish, flounder, blue crabs, and shrimp are key saltwater species found on the refuge. Catfish, largemouth bass, and various sunfish species are found in the freshwater areas of the Refuge.
Shoreline Type:	Seaward Shore Type: 3A: Fine- to medium-grained sand beaches 5: Mixed sand and gravel beaches 6A: Gravel beaches 7: Exposed tidal flats 9A: Sheltered tidal flats Landward Shore Type: 6B: Riprap 10A: Salt- and brackish-water marshes 10B: Freshwater marshes
Access:	Boat Only
Contact:	Owned: U.S. Fish and Wildlife Service Email: southeastlouisianarefuges@fws.gov Phone: (985) 882-2000

Figure 5-1 – Environmental Sensitivities & Socioeconomic Resources for Plaquemines Parish, Louisiana cont.

Sensitive Area:	Breton National Wildlife Refuge
Habitat:	The refuge provides a sandy barrier island beach with vegetation comprised of black mangrove, groundsel bush, and wax myrtle. The shallow areas around the islands support beds of manatee, shoal, turtle, and widgeon grass. The habitat provided by the islands offers significant importance for nesting sea, shore, and wading birds.
Wildlife:	The refuge provides crucial habitat and nesting ground for twenty-three species of shore birds and sea birds. Common nesting species include royal, caspian, and sandwich terns, laughing gulls, brown pelicans, and black skimmers. The refuge has a large tern colony and a nesting population of endangered brown pelicans. During the winter large numbers of waterfowl such as redheads, canvasback, and scaup frequent the numerous islands. The submerged aquatic grasses in the northern islands make this area one of the top four most important wintering areas for redhead ducks in the U.S. Frigate birds are commonly observed flying over the refuge. Endangered species that inhabit the refuge are brown pelicans, piping plover and least terns.
Shoreline Type:	Seaward Shore Type: 2A: Exposed Wave-cut Platform in clay 2B: Exposed scarps and steep slopes in clay 3A: Fine- to medium-grained sand beaches 5: Mixed sand and gravel beaches 6A: Gravel beaches 7: Exposed tidal flats 9A: Sheltered tidal flats 10A: Salt- and brackish-water marshes 10D: Scrub-shrub wetlands Landward Shore Type: 2A: Exposed Wave-cut Platform in clay 3A: Fine- to medium-grained sand beaches 5: Mixed sand and gravel beaches 6A: Gravel beaches 6B: Riprap 10A: Salt- and brackish-water marshes 10D: Scrub-shrub wetlands
Access:	Boat Only
Contact:	Owned: U.S. Fish and Wildlife Service Email: breton@fws.gov Phone: (985) 882-2000

Figure 5-1 – Environmental Sensitivities & Socioeconomic Resources for Plaquemines Parish, Louisiana cont.

Sensitive Area:	Pass a Loutre Wildlife Management Area
Habitat:	The 115,000 acre area is characterized by river channels with attendant channel banks, natural bayous, and man-made canals which are interspersed with intermediate and fresh marshes. Hurricane damage and subsidence have contributed to a major demise of vegetated marsh areas resulting in formation of large ponds. Habitat development is primarily directed toward diverting sediment-laden waters into open bay systems (i.e., creating delta crevasses), which promotes delta growth.
Wildlife:	Waterfowl and other migratory game bird, rabbit, deer. Freshwater fish species including bass, bream, catfish, crappie, warmouth, drum, and garfish can be caught in the interior marsh ponds. Salt water fish species include redfish, speckled trout and flounder.
Shoreline Type:	Seaward Shore Type 2A: Exposed Wave-cut Platform in clay 3A: Fine- to medium-grained sand beaches 5: Mixed sand and gravel beaches 6A: Gravel beaches 6B: Riprap 7: Exposed tidal flats 9A: Sheltered tidal flats 10A: Salt- and brackish-water marshes 10B: Freshwater marshes 10C: Freshwater swamps Landward Shore Type 1B: Exposed, solid man-made structures 2A: Exposed Wave-cut Platform in clay
Access:	Boat Only
Contact:	Owned: Louisiana Department of Wildlife and Fisheries Email: sgranier@wlf.la.gov Phone: (504) 284-5264

Figure 5-1 – Environmental Sensitivities & Socioeconomic Resources for Plaquemines Parish, Louisiana cont.

Socio-Economic Sensitives	Description
Water Intakes:	Surface Raw Water Intake • Belle Chasse Water District • Dalcour waterworks District • Pointe a la Hache W S • Port Sulphur water District Public Water Intake • Dalcour Water Intake • Belle Chase Water Intake • Boothville Water Intake • Empire Water Intake Industrial Water Intake • International Matex Terminal Site • United Bulk Terminal • Freeport Nickle Plant • Tennessee Gas Pipeline • Freeport Dock • Harvest States Grain Elevator Diversions • West Point La Hache Fresh Water Diversion • Ostrica Locks • Bayou Lamoque
Commercial Fishing:	Essential Fish Habitat for Shrimp, Crab, Oyster, Finfish, and Crawfish
Shipping Fairway:	Shipping Safety Fairway • Grand Bayou Pass • Empire to the Gulf • South Pass, South Pass to Sea • Southwest Pass to Sea • Mississippi River-Gulf Outlet Coastal Maintained Channels • Southwest Pass Channel • South Pass Channel • Baptiste Collette Bayou
Nearby Platforms:	Please see the Offset Operators Map in Section 6 of this response discussion. Platforms shown are current as of the date the response discussion was developed.

6) Response

BP GoM has contracted with OSROs as identified in **Section 7** of the OSRP. Upon notification of a spill, BP GoM could request a partial or full mobilization of the resources referenced in **Appendix E** of the OSRP. The Qualified Individual, Incident Commander or his/her designee may contact other service companies if appropriate.

Release Modeling

When oil is released, modeling may serve as an important tool in planning a response. It is important to understand how the oil may behave based on oil characteristics, so that the proper response measures can be taken. One tool that can be used for modeling is NOAA's Automated Data Inquiry for Oil Spills 2 (ADIOS2), which is an oil spill response software tool for emergency spill responders and contingency planners. ADIOS2 is designed to model the natural evaporation and dispersion of various types of oil on the surface of the water. Integrated within the tool is an oil library with a short-term oil fate and cleanup model to help responders/planners estimate the amount of time that spilled oil will remain in the marine environment and develop cleanup strategies. The results of the ADIOS2 model may be used to estimate the volume of oil remaining on the surface after natural evaporation and dispersion have taken place as well as determine the appropriate response technologies that need to be used for the remaining oil. However, the actual behavior of the released product during an incident could be affected by many factors and may, as a result, vary from the ADIOS2 model results.

Response Technologies Discussion

This section discusses various response technologies (in no prioritized order) that might be used during a response to a release of oil from MC 778. The particular response technologies applied during a spill event will be coordinated based on the most accurate and up-to-date knowledge of the situation, the locations at which particular technologies are applied and the implementation of simultaneous operations (SIMOPS). Currently there are no new or unusual technologies proposed for spill prevention, control, or cleanup.

The status boards below set forth a representative list of equipment and are not meant to be exhaustive. The status boards outline on-water containment; on-water recovery; temporary storage; aerial, vessel and subsea dispersant application; in-situ burning and shoreline protection equipment identified as most relevant in addressing the volume of oil that does not either evaporate or naturally disperse into the water column. These status boards estimate times needed for procurement, load out, travel time to the site and deployment.

6) Response (Cont'd)

The status boards show that upon notification of an incident, dispersant operations can commence within an estimated 5 hours, pending regulatory approval, followed by on-water recovery which can be on site and operational within an estimated 9 hours. According to the status boards, BP can be on site with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable, within an estimated 4-5 days. Consistent with the maximum extent practicable standard, and given the uncertainties and situation-specific variations associated with a marine oil release, this plan cannot guarantee that BP's response to oil discharged offshore will in all cases prevent oil from reaching shorelines or impacting resources.

Surveillance

Upon notification of a release and mobilization of the response, either a fixed-wing aircraft or a field-support helicopter would be dispatched as promptly as possible (considering available daylight hours, weather conditions and other safety factors) in order to conduct visual surveillance at the source of the spill. If necessary, visual surveillance could be supplemented through use of field vessels. The effectiveness of many response technologies (such as in-situ burning, dispersant application and mechanical recovery) may be enhanced through collaboration with air-based spotters, who can guide these systems to oil concentrations and coordinate SIMOPS. Air-based spotters may be equipped with air to marine/ground communication equipment to facilitate immediate communications with marine- and land-based response assets. Vessel locations may also be monitored in real-time using vessel-tracking technologies (such as AIS data, GPS-based tracking, cell phone data, etc.), which can facilitate vessels being deployed for optimal recovery. Further information regarding methods of identifying and tracking a spill on water are discussed in **Section 11** in the OSRP. Specifically, Figure 11-2 sets forth various oil spill detection systems, remote thickness detection systems, and other remote sensing technologies that could be utilized in a response.

6) Response (Cont'd)**Source Containment/Source Control**

Source containment and source control operations would be implemented simultaneously with the above response technologies to either reduce or stop the flow of the well into the environment. Source containment is designed to temporarily stop or redirect the flow from the well. Source control addresses the original source through either well-kill operations or the drilling of a relief well to permanently stop the flow of oil from the well.

The steps applied to achieve flow containment will be dependent on the specific characteristics and nature of the spill at hand. This could include multidisciplinary initiatives to recover flow to the surface for contained processing and disposal, efforts to shut-in flow at the source using pressure rated, tight seal fit for purpose assemblies, and techniques to kill (arresting the pressure source) the well. See **Appendix I** of the OSRP for further information needed regarding this topic.

Slick (Fresh Oil) Containment Systems

Slick (fresh oil) containment systems may be deployed (provided it is safe to do so) in thick, fresh oil to minimize further spreading of oil on the water's surface. These systems would typically consist of two offshore vessels (capable of trolling speeds of 0.5 knots) towing between 1,000 to 1,500 feet of offshore boom in a "U" or "V" configuration. The containment systems may allow fresh oil to be contained, concentrated and diverted to both skimming systems and in-situ burn task forces, as appropriate, increasing their encounter rate and containment efficiency in order to support enhanced skimming and burning operations.

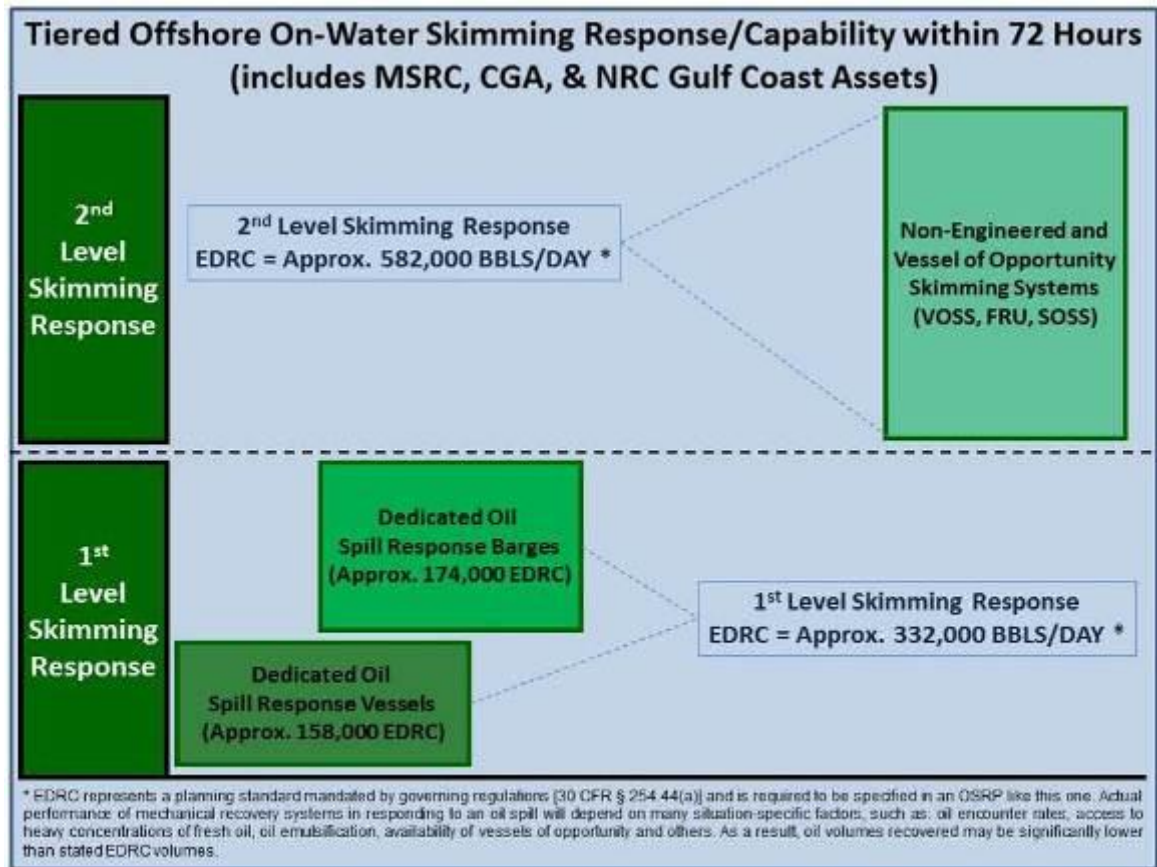
Mechanical Recovery

Mechanical recovery equipment, include Oil Spill Response Vessels (OSRVs), Oil Spill Recovery Barge (OSRBs) and Vessels of Opportunity Skimming System (VOSS) may be mobilized from contracted OSROs. As necessary, response equipment could be cascaded from locations along the Gulf of Mexico and other regions of the United States, as well as from international locations. This equipment could be deployed either at the source of the release or in concentrations of recoverable oil. Offshore mechanical recovery assets could be organized according to span of control concepts within Incident Command System (ICS). Vessels should be organized into task forces or groups with consideration for effective communication and control. As operations increase in scale or complexity, dedicated command/control vessel(s) may be considered for each major operating area or mission. These vessels could provide response activity coordination of all marine assets under their control, as well as provide communication between marine and air assets. Additionally, other technologies such as GPS-based vessel tracking systems may be used to facilitate coordination of marine assets. Positioning this equipment can be facilitated by collaboration with air-based spotters, who can guide these systems to oil concentrations. During night-time operations, skimming activities could be facilitated through the use of alternative spill surveillance technologies (such as infrared [IR] and X-band radio systems) to guide skimming vessels to sufficient concentrations of oil. The specific technologies used will be chosen based on availability suitability, OSRO recommendations, and other situation-specific considerations.

6) Response (Cont'd)

Mechanical Recovery (Cont'd)

The combined Effective Daily Recovery Capacity (EDRC) for the offshore on-water skimming vessel systems is 860,917 barrels; total storage volume for these dedicated systems is 1,013,679 barrels. (EDRC represents a planning standard mandated by governing regulations [30 CFR § 254.44(a)] and is required to be specified in an OSRP. Actual performance of mechanical recovery systems in responding to an oil spill will depend on many situation-specific factors, such as: oil encounter rates, access to heavy concentrations of fresh oil, oil emulsification, availability of support vessels and others. As a result, oil volumes recovered may be significantly lower than stated EDRC volumes.) Additional response equipment is available from BP GoM's OSROs; the resources identified in the status boards below represent a "first line of defense" of dedicated oil spill response vessels and barges and select VOSS, identified based on recent response experience. However, a secondary line of defense (primarily VOSS) is available to augment the response if necessary and appropriate under the circumstances, as depicted in the illustration below.



6) Response (Cont'd)**Dispersant Planning Case**

We plan whenever possible to use aerial, vessel based, and/or sub-sea application methodologies. BP's ability to utilize dispersants in a future response will be dependent upon numerous factors, including government actions needed to authorize and support such dispersant use. Most importantly, regulatory approval, pursuant to applicable regulations, must be obtained. As prefaced in **Section 18** of the OSRP, inventories of dispersants available via contract to BP GoM are detailed in Figure 18-2. BP has contracts to acquire dispersants and to implement measures to deploy them with the parties listed in **Appendix D** of the OSRP. In addition to OSRO dispersant stockpiles available to BP GoM, Nalco, the current Corexit 9500 manufacturer, has represented that it anticipates being able to ramp up within 10 to 14 days to begin replenishing stocks piles in support of the anticipated daily dispersant operations, depending on raw material availability.

During the use of dispersants, the Operations and Logistics sections will be tracking daily usage and replenishment rates in order to support dispersant activity for the length of time required to drill a relief well. The use of dispersants can, under the right circumstances, reduce responders' potential exposure to volatile organic compounds (VOCs) at the surface, thereby allowing increased levels of vertical access for source control responders.

6) Response (Cont'd)

Aerial Dispersant Application

Aerial dispersants may be a response option depending on the circumstances of the release. Aerial dispersants are applied under the direction and approval of a designated Federal On Scene Coordinator (FOSC), and in a manner consistent with the National Contingency Plan and the applicable Regional Response plan(s) and/or Area Contingency Plan(s) (ACPs). Spotter aircraft could be activated along with aerial dispersant aircraft to coordinate more precise dispersant application on concentrations of free floating oil and to ensure that dispersant operations do not impact other ongoing response technologies. The table below identifies aerial dispersant application aircraft to which BP GoM has contractual access, as well as their response capacities. A table listing the dispersant stockpile available to BP GoM may be found in **Section 18** of the OSRP.

Aircraft	Owner/Contractor	Dispersant Capacity	Possible Sorties per Day
Regional Assets			
DC-3	ASI (through CGA)	1,200 gallons	1-4
BT-67 (DC-3 Turboprop)	ASI (through CGA)	2,000 gallons	1-4
BE-90 King Air	MSRC	425 gallons	1-4
BE- 90 King Air	MSRC	425 gallons	1-4
Boeing 737	MSRC	4,125 gallons	1-4
Out-of-Region Assets			
ADDs Pack	OSRL	5,000 gallons	1-4

For planning purposes, BP GoM assumes a 1:20 application rate and approximately a 50 to 75% effectiveness rate. Based on the estimates regarding aircraft dispersant capacities identified in the table above, 13,175 to 52,700 gallons of dispersant could be applied per day, which translates to approximately 3,136 to 18,821 barrels per day based on the stated application rate and range of estimated effectiveness. It is important to note that studies, laboratory tests, and field tests show a relatively wide range for the optimal application rate and actual effectiveness rate of dispersants applied to spilled oil. These rates may vary depending upon an assortment of situation-specific variables such as water temperature, weather, and timely access to the released oil. Further information regarding dispersant application methods and monitoring may be found in **Section 18** of the OSRP.

Vessel-Based Dispersant Application

Vessel-based dispersant application may be another effective response option. In previous responses, boat-spray systems were used for both dispersing oil and suppressing vapors on the water surface near the spill source. Vessel-based dispersants are also applied under the direction and approval of a designated FOSC, and in a manner consistent with the National Contingency Plan and the applicable Regional Response Plan(s) and/or ACPs. If appropriate, vessel spray systems can be installed on offshore vessels under contract to apply dispersants at the source or at other areas where there are significant concentrations of oil. Using inductor nozzles installed on fire-water monitors, skid mounted systems, or purpose-built boom-arm spray systems, vessels can initially apply dispersant beginning in the first 12 to 24 hours of the response, pending regulatory approval and thereafter as needed. In previous responses, boat-spray systems were used for both dispersing oil and suppressing vapors on the water surface near the spill source.

6) Response (Cont'd)**Subsea Dispersant Application**

Depending on the circumstances, the use of a subsea dispersant application system may provide another response option in the event of a subsurface well blowout or other ongoing subsurface release. A modular Subsea Dispersant Application Unit (SDAU)—including an integrated chemical storage, distribution and deployment system—may be installed at the spill site, in close proximity to the release.

The subsea application of dispersants is a new variation on proven dispersant technology. Therefore, certain assumptions, including application rates and effectiveness, have been made based on past experience. However, additional data and information collection, laboratory tests, and field tests have been conducted and reviewed by industry, government, and/or academia, to further optimize application rates and anticipated effectiveness rates for subsea dispersant application. For planning purposes, and subject to obtaining regulatory approval, BP GoM assumes a 1:75 application rate, at 50 to 75% effectiveness, and a system flow rate of 8 to 11 gallons per minute (approximately 11,500 to 16,000 gallons of dispersant per day). During a past response, the EPA limited sub-surface dispersant usage to 15,000 gallons per day. Under those assumptions, the system might be capable of dispersing approximately 10,268 to 21,429 barrels of oil per day. A table listing the dispersant stockpile available to BP GoM may be found in **Section 18** of the OSRP.

In-Situ Burning Planning Case and Strategy

Open-water in-situ burning (ISB) also may be used as a response strategy depending on the circumstances of the release. ISB services may be provided by the primary OSRO contractors. BP GoM plans, support the use of ISB as a response methodology when conditions allow it. In past responses, ISB has been successfully used to remove oil from the response area. Under some circumstances, open water ISB of oil can be a safe and effective oil removal technique. The effective use of ISB depends on specific operational and environmental conditions, and on the composition and condition of the oil to be burned. In addition, the performance of ISB is subject to government regulation, approval and supervision throughout the burning process.

Additional ISB systems may be purchased, as production allows, from specialized fire boom manufacturers. For example, Elastec/American Marine, a widely-known supplier of boom in both the US and internationally, is capable of producing boom at a rate of up to one new system every 3 days, after a 6-8 week initial lead time (to allow procurement of source materials and to dedicate fabrication capabilities). Non-consumable components of the fire boom system may be reused with replacement boom, which could allow faster replenishment of available fire boom systems. During the use of ISB, the Operations and Logistics sections will be tracking daily usage and replenishment rates in order to support ISB activities for the length of time required to drill a relief well.

6) Response (Cont'd)

In-Situ Burning Planning Case and Strategy (Cont'd)

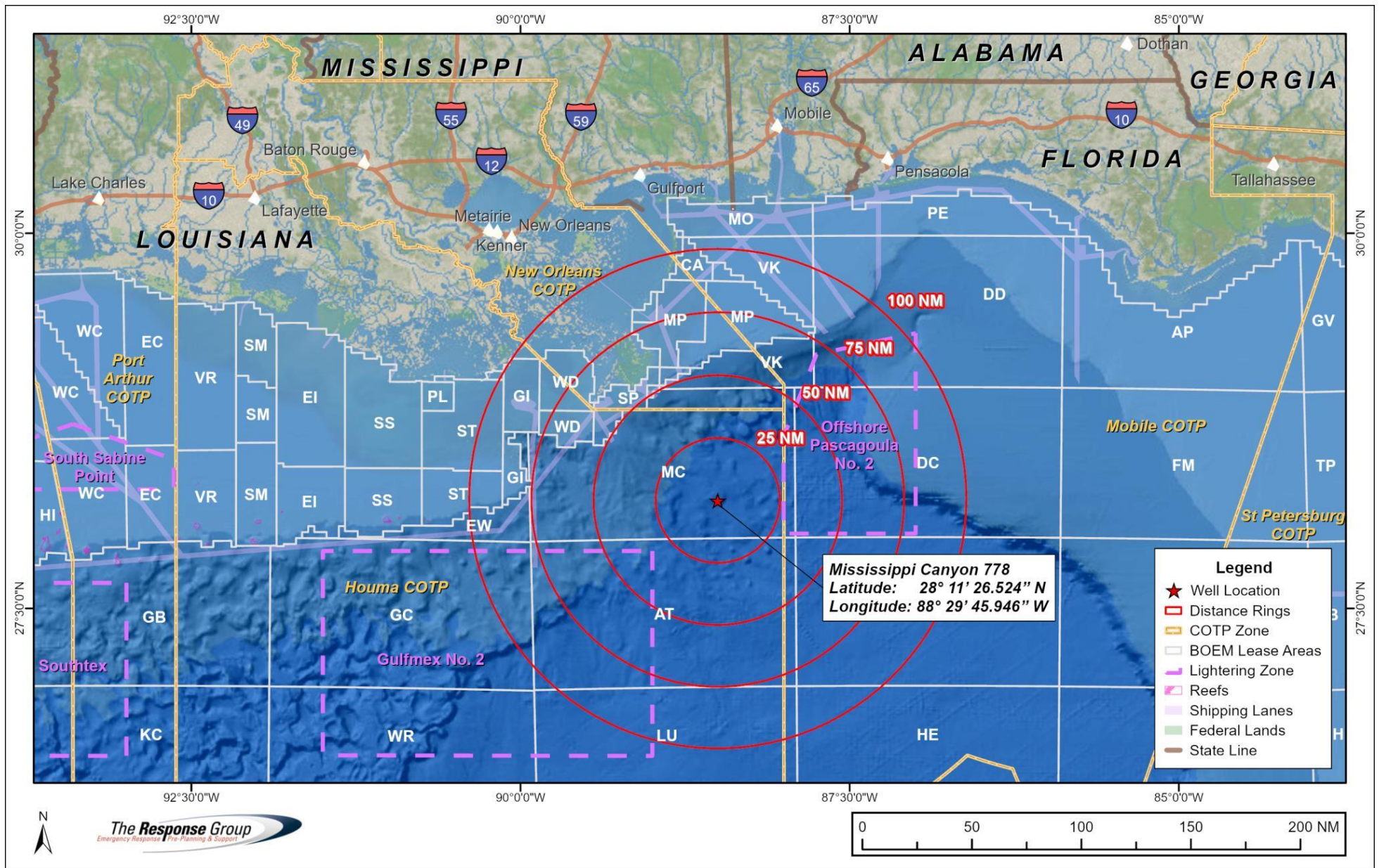
If appropriate conditions exist and approvals are granted, one to multiple ISB task forces could be deployed offshore. Task forces typically consist of two to four fire teams, each with two vessels capable of towing fire boom, guide boom or tow line and equipped with either handheld or aerially-deployed oil ignition systems. At least one support/safety boat would be present during active burning operations to provide logistics, safety and monitoring support. Depending upon a number of factors, including weather conditions and the nature and distribution of oil, up to 4 burns per 12-hour day may be completed per ISB fire team. Depending on weather and fire intensity, most fire boom systems can be used for approximately 8 to 12 burns before being replaced. Although the number of barrels eliminated per burn is dependent on many factors, past experience suggests that a typical burn might eliminate approximately 600 to 750 barrels. Based on these assumptions, a single task force of two fire teams assuming appropriate conditions, including weather and safety each completing four burns per day might be capable of removing up to approximately 4,800 to 6,000 barrels of oil per day. (See e.g., August 2010 reports: "Deepwater Horizon MC252 Gulf Incident Oil Budget" and "BP Deepwater Horizon Oil Budget: What Happened to the Oil?") Additional information on ISB is presented in **Section 19** of the OSRP.

Shoreline Response

While historical trajectory modeling is important for planning response tactics, the potential direction and impact of a spill depends heavily upon existing environmental conditions during an actual response. Strategies developed during tactical planning would be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Near shore response may include the deployment of shoreline boom to protect beach areas, or protection and sorbent boom for vegetated areas. The ACP and relevant agencies including, as appropriate, "branch offices" similar to those stood up in previous responses can be consulted to ensure that environmental, special economic and cultural resources are correctly identified and prioritized to ensure optimal protection. If impact does occur, onshore cleanup response may include specialized beach and marsh cleanup techniques.

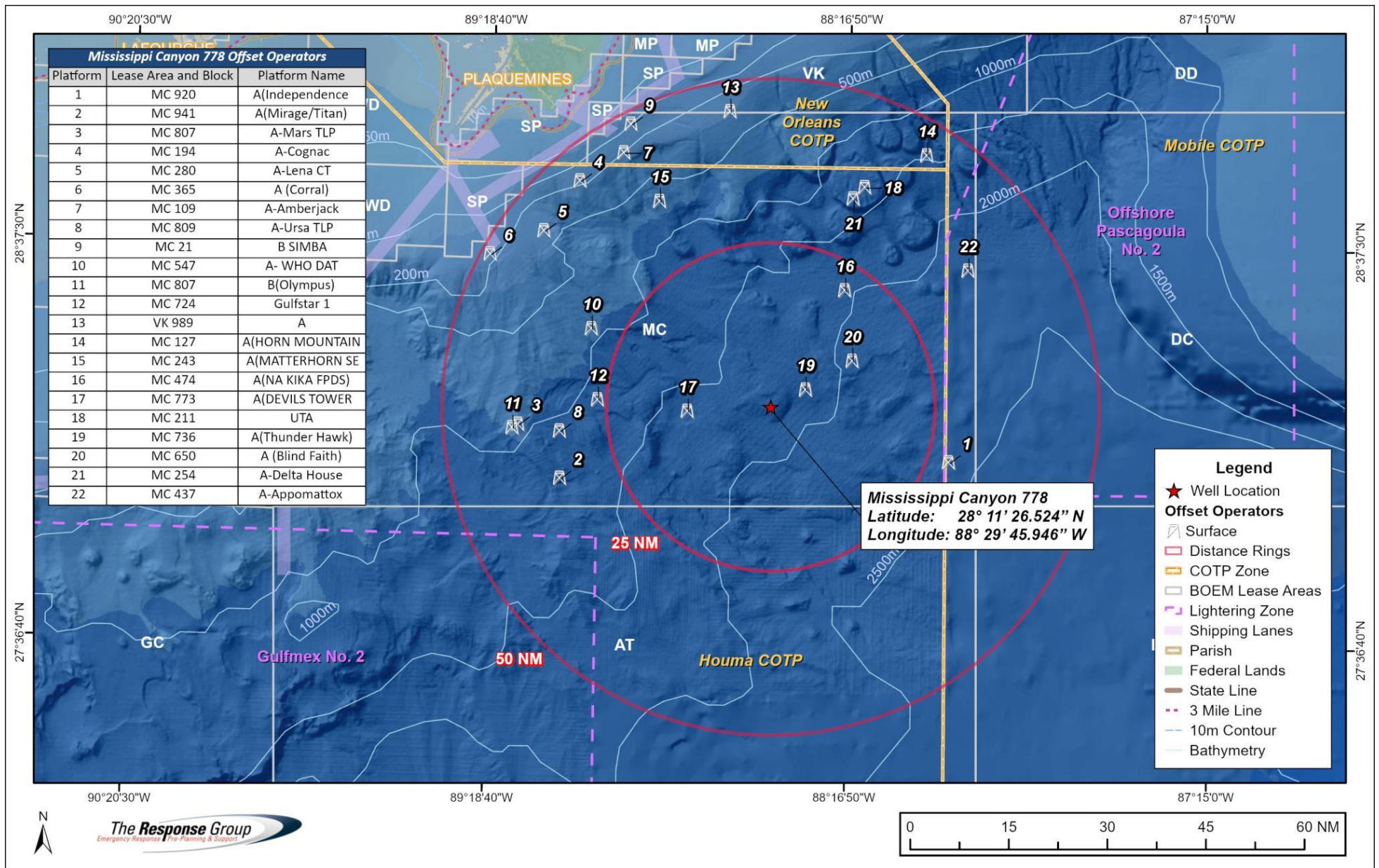
The status boards listed in the latter part of this section show equipment could be deployed for the protection of these shorelines. From the table labeled, "Sample Shoreline Protection and Wildlife Support List", it is shown that upon receipt of notification, equipment can be onsite and operational within 6 hours.

The Response Group's Shoreline Response Guides identify response strategies including equipment and personnel needs, possible tactics, and detailed job descriptions (ICS 204 Field Assignments) applicable for oil spill protection and clean-up operations. The guides are a tool for operational planning and logistics to initiate the procurement and deployment of resources while branch operations are established. Early tactical planning and deployment of advance (forward) teams should be considered to establish locations for branch offices as needed. (For more information on resource identification, see **Section 12** of the OSRP; for more information on resource protection methods, see **Section 13** of the OSRP; for more information on mobilization see **Section 14** of the OSRP.

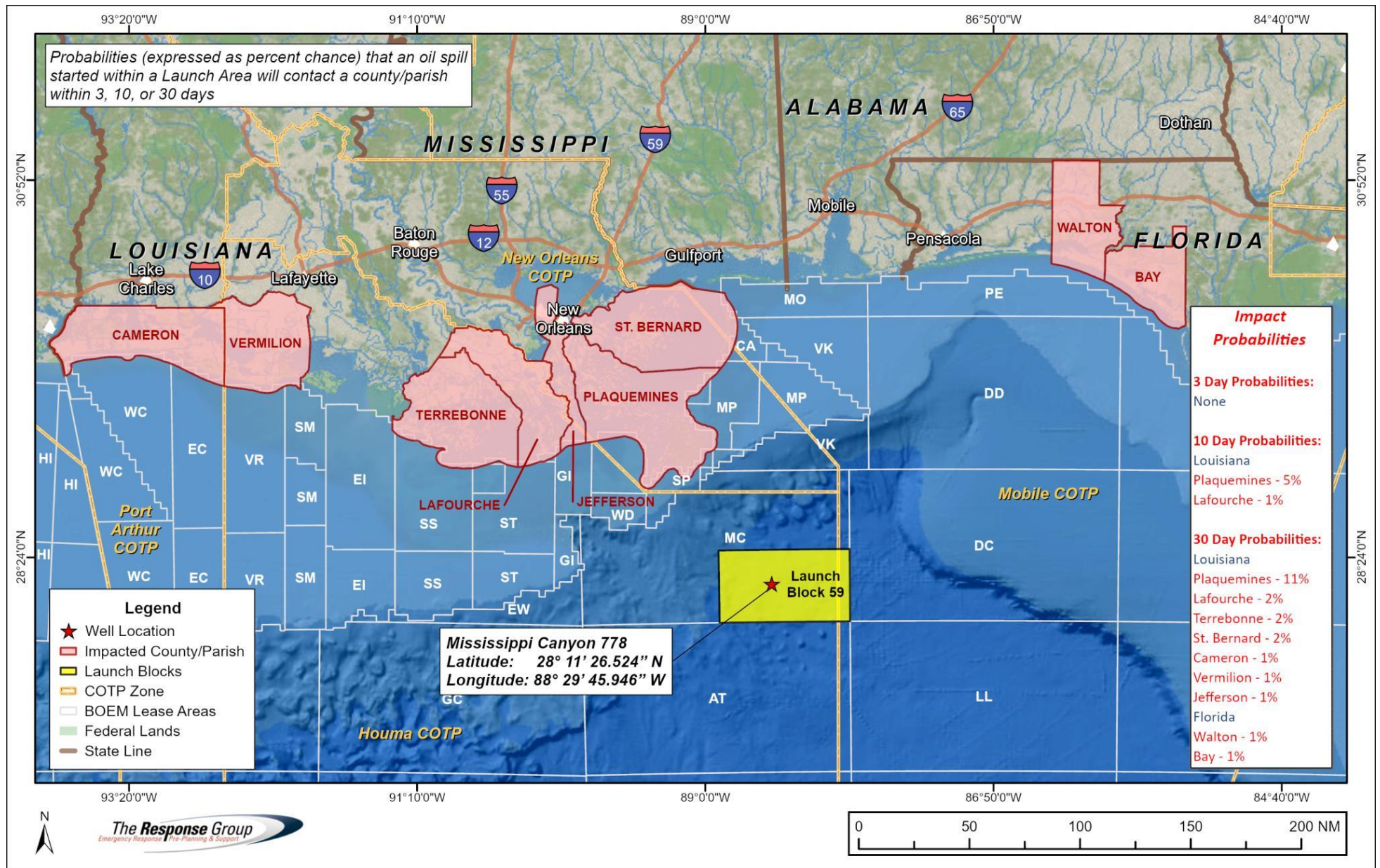


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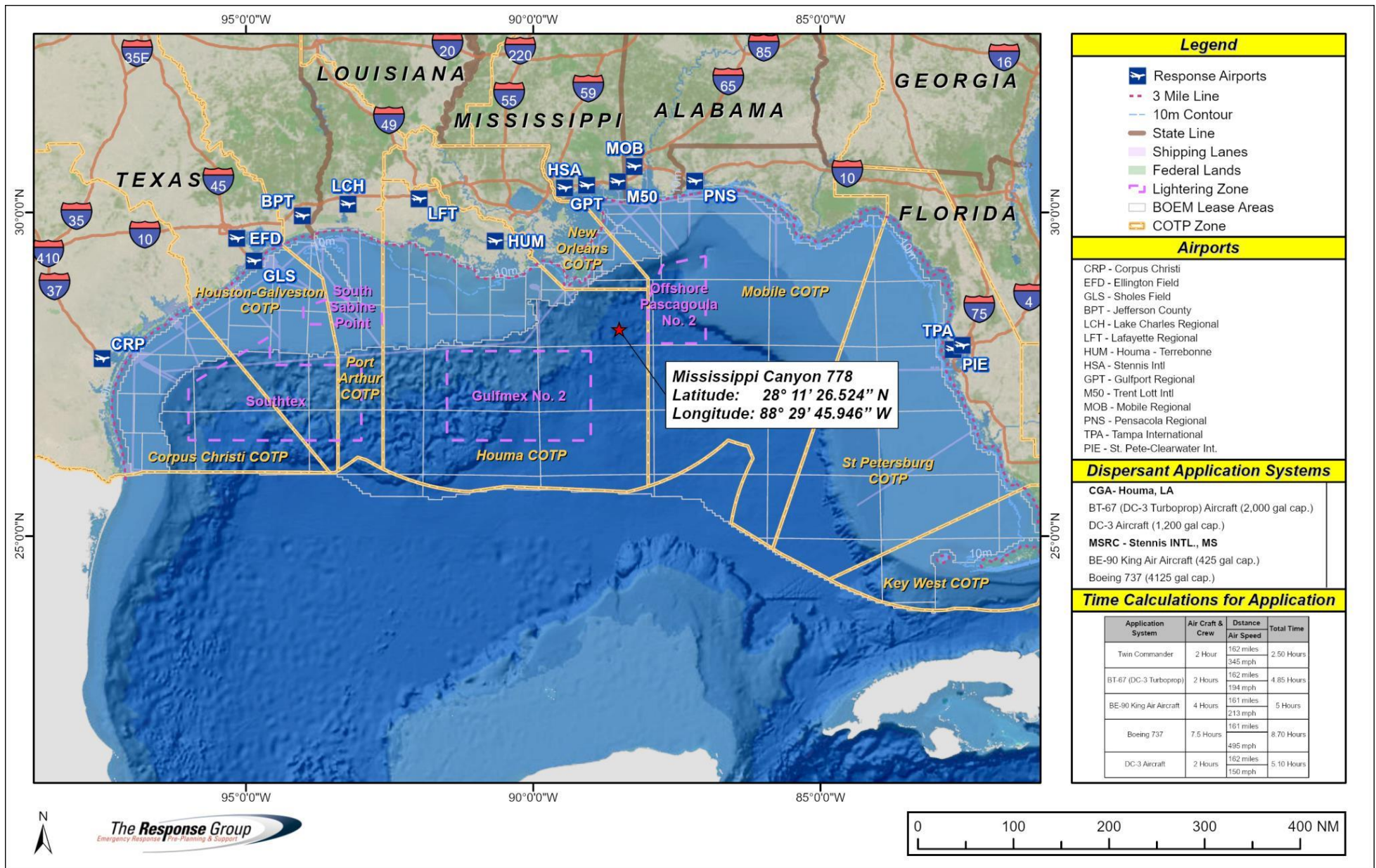
MC 777



07/20/2022



07/20/2022



Mississippi Canyon 778 - Drilling > 10 Miles

Sample Aerial Surveillance Activation List

Aerial Surveillance System	Supplier & Phone	Airport/ City, State	Aerial Surveillance Package	Quantity	Staging Location	Distance to Site from Staging (nautical miles)	Response Times (Hours)			
							Staging ETA	Loadout Time	ETA to Site	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified.										
Twin Commander Air Speed - 170 Knots	Airborne Support (985) 851-6391	Houma, LA	Surveillance Aircraft	1	Houma, LA	162	1	0.25	0.83	2.10
			Spotter Personnel	2						
			Crew - Pilots	1						
Helicopter Air Speed - Estimated 130 knots	Bristow (985) 288-1250	Galliano, LA	Surveillance Aircraft	1	Galliano, LA	137	1	0.25	0.92	2.20
			Spotter Personnel	2						
			Crew - Pilots	1						
Helicopter Air Speed - Estimated 130 knots	Bristow (985) 288-1250	Galliano, LA	Surveillance Aircraft	1	Galliano, LA	137	1	0.25	0.92	2.20
			Spotter Personnel	2						
			Crew - Pilots	1						
Eurocopter EC-135 Helicopter Air Speed - 141 knots	PHI (800) 235-2452	Houma, LA	Surveillance Aircraft	1	Houma, LA	162	1	0.25	1.00	2.25
			Spotter Personnel	2						
			Crew - Pilots	1						
Sikorsky S-76 Helicopter Air Speed - 141 knots	PHI (800) 235-2452	Houma, LA	Surveillance Aircraft	1	Houma, LA	162	1	0.25	1.00	2.25
			Spotter Personnel	2						
			Crew - Pilots	1						
Beechcraft King Air 200 Air Speed - 269 mph	Western Airways (800) 373-0896	Sugar Land, TX	Surveillance Aircraft	1	Sugar Land, TX	444	1	0.25	1.44	2.70
			Spotter Personnel	2						
			Crew - Pilots	1						
Beechcraft King Air 200 Air Speed - 269 mph	Western Airways (800) 373-0896	Sugar Land, TX	Surveillance Aircraft	1	Sugar Land, TX	444	1	0.25	1.44	2.70
			Spotter Personnel	2						
			Crew - Pilots	1						

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore Slick Containment Activation List

Skimming System	Supplier & Phone	Warehouse	Containment Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability.* - These components are additional operational requirements that must be procured in addition to the system identified.											
** - The boom on this barge will be combined with vessels to create multiple containment systems, depending on the needs of the response.											
Offshore Containment System	MSRC (800) OIL-SPIL	Belle Chasse, LA	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	4	1	21	1	27
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Lake Charles, LA	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	7	1	21	1	30
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Lake Charles, LA	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	7	1	21	1	30
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore Slick Containment Activation List

Skimming System	Supplier & Phone	Warehouse	Containment Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability.* - These components are additional operational requirements that must be procured in addition to the system identified.											
** - The boom on this barge will be combined with vessels to create multiple containment systems, depending on the needs of the response.											
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore Slick Containment Activation List

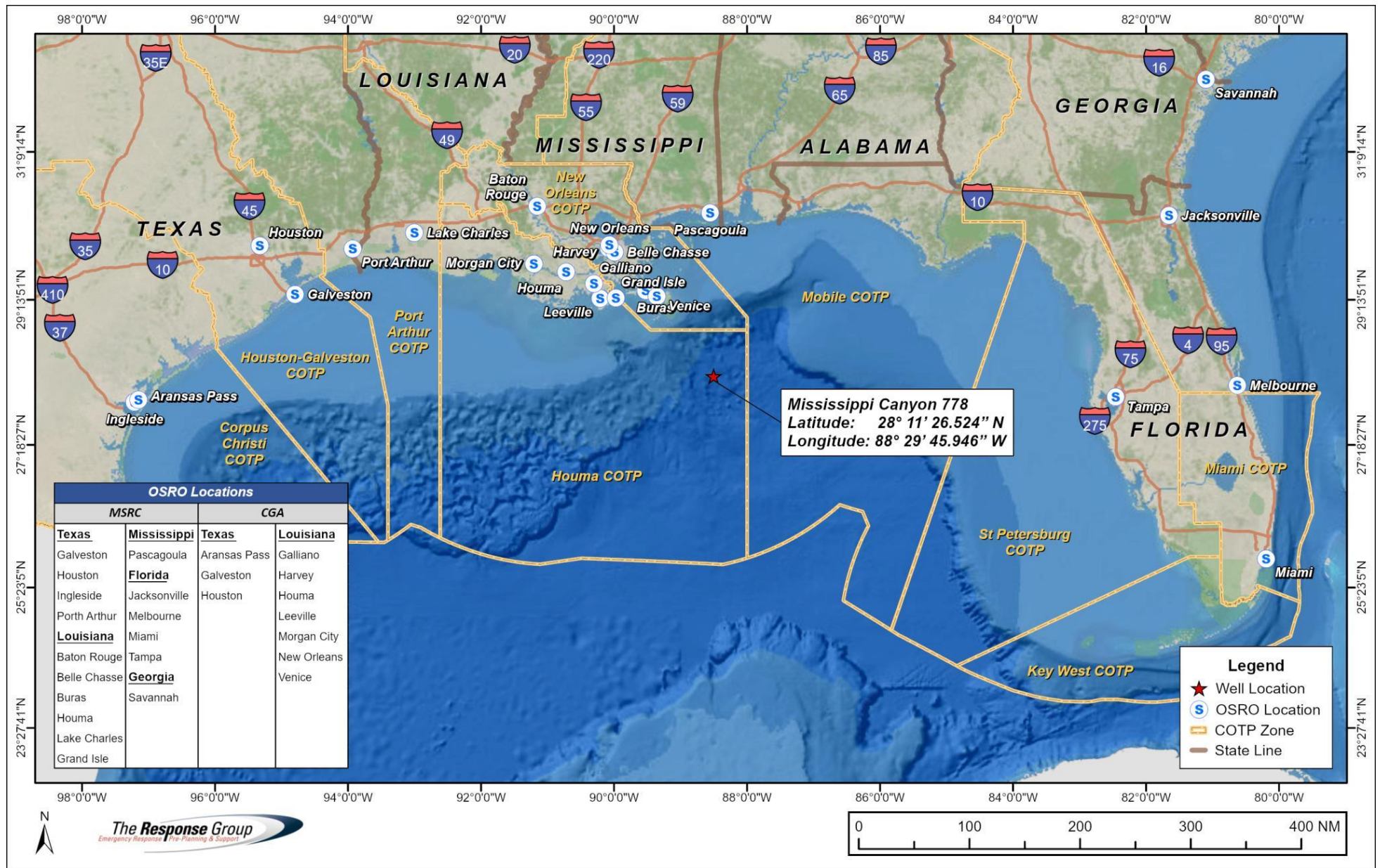
Skimming System	Supplier & Phone	Warehouse	Containment Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability.* - These components are additional operational requirements that must be procured in addition to the system identified. ** - The boom on this barge will be combined with vessels to create multiple containment systems, depending on the needs of the response.											
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles Sample Offshore Slick Containment Activation List

Skimming System	Supplier & Phone	Warehouse	Containment Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability.* - These components are additional operational requirements that must be procured in addition to the system identified.											
** - The boom on this barge will be combined with vessels to create multiple containment systems, depending on the needs of the response.											
Offshore Containment System	MSRC (800) OIL-SPIL	Houston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9	1	21	1	32
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Galveston, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	9.5	1	21	1	32.5
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
CGA-300 Boom Barge **	CGA (888) 242-2007	Leeville, LA	43" Auto Boom (ft)	25,000'	Leeville, LA	135	12	0	17	4	33
			Ocean Tug	1							
			* 70'+ Vessel	50							
			Personnel	400							
			Safety Monitor	5							
Offshore Containment System	MSRC (800) OIL-SPIL	Ingleside, TX	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	12.25	1	21	1	35.25
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
Offshore Containment System	MSRC (800) OIL-SPIL	Miami, FL	67" Pressure Inflatable Boom	1,320'	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2							
			* Personnel	4							
			* Safety Monitor	1							
TOTAL SLICK CONTAINMENT BOOM SYSTEMS (FEET)											
										94,960'	

07/20/2022



07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore Aerial Dispersant Activation List

Aerial Dispersant System	Supplier & Phone	Airport/ City, State	Aerial Dispersant Package	Quantity	Staging Location	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
NOTE: Planholder has access to additional dispersant assets. For a comprehensive list of assets, see Section 18. * - These components are additional operational requirements that must be procured in addition to the system(s) identified. ** - The second flight times listed are to demonstrate subsequent sortie and application timeframes. *** - The dispersants listed is for gallon capacity only not amount stored at each location.											
Twin Commander Air Speed - 300 Knots	CGA/Airborne Support (985) 851-6391	Houma, LA	Turbo Commander AC90	1	Houma, LA	162	2	0	0.47	0	2.50
			Spotter Personnel	2							
			Crew - Pilots	1							
BT-67 (DC-3 Turboprop) Aircraft Air Speed - 169 Knots	CGA/Airborne Support (985) 851-6391	Houma, LA	DC-3 Dispersant Aircraft	1	Houma, LA 1st Flight	162	2	1.5	0.83	0.5	4.85
			Dispersant - Gallons	2000							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	162	0.83	0.5	0.83	0.3	2.50
			Crew - Pilots	2							
BE-90 King Air Aircraft Air Speed - 185 Knots	MSRC (800) OIL-SPIL	Kiln, MS	BE-90 Dispersant Aircraft	1	Stennis INTL., MS 1st Flight	161	4	0.0	0.76	0.20	5.00
			Dispersant - Gallons	425							
			* Spotter Aircraft	1							
			* Spotter Personnel	2	Stennis INTL., MS 2nd Flight	161	0.76	0.3	0.76	0.20	2.05
			Crew - Pilots	2							
DC-3 Aircraft Air Speed - 130 Knots	CGA/Airborne Support (985) 851-6391	Houma, LA	DC-3 Dispersant Aircraft	1	Houma, LA 1st Flight	162	2	1.5	1.08	0.5	5.10
			Dispersant - Gallons	1200							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	162	1.08	0.5	1.08	0.3	3.00
			Crew - Pilots	2							
BE-90 King Air Aircraft Air Speed - 185 Knots	MSRC (800) OIL-SPIL	Bridgewater, VA	BE-90 Dispersant Aircraft	1	Stennis INTL., MS 1st Flight	161	15	0.3	0.76	0.20	16.30
			Dispersant - Gallons	425							
			* Spotter Aircraft	1							
			* Spotter Personnel	2	Stennis INTL., MS 2nd Flight	161	0.76	0.3	0.76	0.20	2.05
			Crew - Pilots	2							
Boeing 737 Air Speed - 430 Knots	MSRC (800) OIL-SPIL	Moses Lake, WA	737 Disp. Aircraft	1	Stennis INTL., MS 1st Flight	161	7.5	0.3	0.33	0.5	8.70
			Dispersant - Gallons	4125							
			*Spotter Aircraft	1							
			*Spotter Personnel	2	Stennis INTL., MS 2nd Flight	161	0.50	0.3	0.33	0.5	1.70
			Crew - Pilots	2							

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore Boat Spray Dispersant Activation List

Boat Spray Dispersant System	Supplier & Phone	Warehouse	Boat Spray Dispersant Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
NOTE: Planholder has access to additional dispersant assets. For a comprehensive list of assets, see Section 18. * - These components are additional operational requirements that must be procured by OSROs in addition to the system(s) identified.											
USCG SMART Team	USCG	Mobile, AL	Personnel	4	Venice, LA	105	6	1	7.5	0.5	15
			* Crew Boat	1							

Mississippi Canyon 778 - Drilling > 10 Miles Sample In-Situ Burn Equipment Activation List											
Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
NOTE: Planholder has access to additional ISB assets. For a comprehensive list of those assets, see Section 19. Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. * - These components are additional operational requirements that must be procured in addition to the system identified. ** - Teams will deploy in sections of 500' at any given time											
ISB Fire-Fighting Team	TBD	TBD	* Offshore Firefighting Vessels	2	Venice, LA	105	4	1	7.5	1	13.5
			* Cranes	2							
			* Roll-off Boxes	2							
			Personnel	8							
			* Air Monitoring Equipment	2							
SMART In-Situ Burn Monitoring Team	USCG	Mobile, AL	* Air Monitoring Equipment	1	Venice, LA	105	4	1	7.5	1	13.5
			* Offshore Vessel	1							
			Personnel	4							
Safety Monitoring Team	TBD	TBD	* Air Monitoring Equipment	1	Venice, LA	105	4	1	7.5	1	13.5
			* Offshore Vessel	1							
			Personnel	4							
Wildlife Monitoring Team	TBD	TBD	* Air Monitoring Equipment	1	Venice, LA	105	4	1	7.5	1	13.5
			* Offshore Vessel	1							
			Personnel	4							
Aerial Spotting Team (per 2 ISB Task Forces)	TBD	TBD	Fixed Wing Aircraft	1	Venice, LA	105	4	1	7.5	1	13.5
			Trained ISB Spotter	2							
			ISB Documenter	1							
Supply Team (Supply Vessel System)	MSRC (800) OIL-SPIIL	Venice, LA	* Offshore Vessel 110' - 310'	1	Venice, LA	105	4	1	21	1	27
			Personnel	6							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIIL	Lake Charles, LA	** Fire Boom (ft)	2,000	Venice, LA	105	7	1	21	1	30
			Tow Line (ft)	600							
			* Appropriate Vessel	2							
			Personnel	2							
			Ignition Device	25							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIIL	Houston, TX	** Fire Boom (ft)	16,000	Venice, LA	105	9	1	21	1	32
			Tow Line (ft)	600							
			* Appropriate Vessel	2							
			Personnel	2							
			Ignition Device	155							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIIL	Galveston, TX	** Fire Boom (ft)	1,000	Venice, LA	105	9.5	1	21	1	32.5
			Tow Line (ft)	600							
			* Appropriate Vessel	2							
			Personnel	2							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIIL	Edison/Perth Amboy, NJ	** Fire Boom (ft)	1,000	Venice, LA	105	22.75	1	21	1	45.75
			Tow Line (ft)	600							
			* Appropriate Vessel	2							
			Personnel	2							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	CGA (888) 242-2007	Harvey, LA	Fire Boom (ft)	500	Venice, LA	105	13.75	24	10.5	2	50.25
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	3							
			Personnel	20							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	CGA (888) 242-2007	Harvey, LA	Fire Boom (ft)	500	Venice, LA	105	13.75	24	10.5	2	50.25
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	3							
			Personnel	20							
			Ignition Device	10							
TOTAL FIRE BOOM AVAILABLE (FEET)										21,000	

Mississippi Canyon 778 - Drilling > 10 Miles Sample Offshore On-Water Recovery & Storage Activation List													
Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. * - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment. *** - Specific barge names may vary.													
FRV Breton Island	CGA (888) 242-2007	Venice, LA	Lamor Brush Skimmer	2	22,885	249	Venice, LA	105	2	0	6	1	9
			36" Boom	64									
			95' Vessel	1									
			Oil Spill Detection System	1									
			Personnel	6									
FRV JL O'Brien	CGA (888) 242-2007	Leeville, LA	Lamor Brush Skimmer	2	22,885	249	Leeville, LA	135	2	0	10	1	13
			36" Boom	64									
			95' Vessel	1									
			Oil Spill Detection System	1									
			Personnel	6									
Louisiana Responder Transec 350	MSRC (800) OIL-SPIIL	Fort Jackson, LA	Transrec Skimmer	1	10,567	4,000	Fort Jackson, LA	114	2	1	10	1	14
			Back - Stress 1 Skimmer	1									
			67" Pressure Inflatable Boom	2640'									
			210' Vessel	1									
			Personnel	11									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
			FAES #4 "Buster"	1									
S.T. Benz Responder LFF 100 Brush	MSRC (800) OIL-SPIIL	Grand Isle, LA	LFF 100 Brush Skimmer	1	18,086	4,000	Grand Isle, LA	117	3	1	10	1	15
			Backup - Stress 1 Skimmer	1									
			67" Pressure Inflatable Boom	1320'									
			210' Vessel	1									
			Personnel	11									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
			FAES #4 "Buster"	1									
Mississippi Responder Transec-350	MSRC (800) OIL-SPIIL	Pascagoula, MS	Transrec Skimmer	1	10,567	4,000	Pascagoula, MS	153	2	1	13	1	17
			Backup - Stress 1 Skimmer	1									
			67" Pressure Inflatable Boom	1320'									
			210' Vessel	1									
			Personnel	11									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
			FAES #4 "Buster"	1									
MSRC-401 Offshore Barge	MSRC (800) OIL-SPIIL	Fort Jackson, LA	Offshore Barge	1	11,122	40,000	Fort Jackson, LA	114	4	1	15	1	21
			67" Pressure Inflatable Boom	1320'									
			Crucial Disc Skimmer 88/30	1									
			Backup - Desmi Ocean	1									
			* Appropriate Vessel	1									
			Personnel	9									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
FRV H.I. Rich	CGA (888) 242-2007	Vermilion, LA	Lamor Brush Skimmer	2	22,885	249	Vermilion, LA	296	2	0	20	1	23
			36" Boom	64									
			95' Vessel	1									
			Oil Spill Detection System	1									
			Personnel	6									
MSRC-402 Offshore Barge	MSRC (800) OIL-SPIIL	Pascagoula, MS	Offshore Barge	1	11,122	40,300	Pascagoula, MS	153	4	1	19	1	25
			67" Pressure Inflatable Boom	2310'									
			Crucial Disc Skimmer 88/30	1									
			Backup - Crucial Disc Skimmer 88/30	1									
			* Appropriate Vessel	1									
			Personnel	9									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
FRV Galveston Island	CGA (888) 242-2007	Galveston, TX	Lamor Brush Skimmer	2	22,885	249	Galveston, TX	392	2	0	23	1	26
			36" Boom	64									
			95' Vessel	1									
			Oil Spill Detection System	1									
			Personnel	6									
FOILEX 200	MSRC (800) OIL-SPIIL	Belle Chasse, LA	Offshore Skimmer	1	1,989	0	Venice, LA	105	4	1	21	1	27
			67" Pressure Inflatable Boom "S.T. Benz Responder"	330'									
			Personnel	5									
			*Appropriate Vessel	2									
			*Temporary Storage	1									
				100									

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability.													
* - These components are additional operational requirements that must be procured in addition to the system identified.													
** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
*** - Specific barge names may vary.													
GT-185 w/ adapter	MSRC (800) OIL-SPIIL	Belle Chasse, LA	Offshore Skimmer	1	1,371	0	Venice, LA	105	4	1	21	1	27
			67" Pressure Inflatable Boom "S.T. Benz Responder"	330'									
			Personnel	5									
			*Appropriate Vessel	2									
			*Temporary Storage	1									
FOILEX 250	MSRC (800) OIL-SPIIL	Belle Chasse, LA	Offshore Skimmer	1	3,977	0	Venice, LA	105	4	1	21	1	27
			67" Pressure Inflatable Boom "S.T. Benz Responder"	330'									
			Personnel	5									
			*Appropriate Vessel	2									
			*Temporary Storage	1									
Walosep W-4	MSRC (800) OIL-SPIIL	Belle Chasse, LA	Offshore Skimmer	1	3,017	0	Venice, LA	105	4	1	21	1	27
			67" Pressure Inflatable Boom "S.T. Benz Responder"	330'									
			Personnel	5									
			*Appropriate Vessel	2									
			*Temporary Storage	1									
Stress 1	MSRC (800) OIL-SPIIL	Fort Jackson, LA	Offshore Skimmer	1	15,840	0	Venice, LA	105	4	1	21	1	27
			"Louisiana Responder"	1									
			67" Pressure Inflatable Boom "Mississippi Responder"	330'									
			Personnel	5									
			*Appropriate Vessel	2									
Foilex 150 TDS	CGA (888) 242-2007	Harvey, LA	Weir Skimmer	1	1,131	0	Venice, LA	105	4	12	11	2	29
			Personnel	4									
			* Utility Boat (<100')	1									
			50 bbl Portable tank	1									
				50									
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Venice, LA	Foilex 250 Skimmer	1	4,251	100	Venice, LA	105	4	12	11	2	29
			Personnel	4									
			Utility Boat	1									
			53" Skimming Boom	75'									
			** 67" Sea Sentry	440'									
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Venice, LA	** Crew Boat	1	4,251	100	Venice, LA	105	4	12	11	2	29
			** Add'l Storage	1									
			Foilex 250 Skimmer	1									
			Personnel	4									
			Utility Boat	1									
Stress 1	MSRC (800) OIL-SPIIL	Grand Isle, LA	53" Skimming Boom	75'	15,840	0	Venice, LA	105	6	1	21	1	29
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1									
				100									
Stress 1	MSRC (800) OIL-SPIIL	Pascagoula, MS	Offshore Skimmer	1	15,840	0	Venice, LA	105	6	1	21	1	29
			"S.T. Benz Responder"	1									
			67" Pressure Inflatable Boom "Mississippi Responder"	330'									
			Personnel	5									
			*Appropriate Vessel	2									
Stress 1	MSRC (800) OIL-SPIIL	Pascagoula, MS	*Temporary Storage	1	15,840	0	Venice, LA	105	6	1	21	1	29
			Offshore Skimmer	1									
			"Mississippi Responder"	1									
			67" Pressure Inflatable Boom "Mississippi Responder"	330'									
			Personnel	5									
Stress 2	MSRC (800) OIL-SPIIL	Pascagoula, MS	*Appropriate Vessel	2	3,017	0	Venice, LA	105	6	1	21	1	29
			*Temporary Storage	1									
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom	330'									
			Personnel	5									
FOILEX 250	MSRC (800) OIL-SPIIL	Lake Charles, LA	*Appropriate Vessel	2	3,977	0	Venice, LA	105	7	1	21	1	30
			*Temporary Storage	1									
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom "Mississippi Responder"	330'									
			Personnel	5									
DESMI OCEAN	MSRC (800) OIL-SPIIL	Lake Charles, LA	*Appropriate Vessel	2	3,017	0	Venice, LA	105	7	1	21	1	30
			*Temporary Storage	1									
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom "MSRC 401 Offshore Barge"	330'									
			Personnel	5									

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability.													
* - These components are additional operational requirements that must be procured in addition to the system identified.													
** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
*** - Specific barge names may vary.													
Stress 1	MSRC (800) OIL-SPIIL	Lake Charles, LA	Offshore Skimmer	1	15,840	0	Venice, LA	105	7	1	21	1	30
			"Gulf Coast Responder"										
			67" Pressure Inflatable Boom	330'									
			"MSRC 401 Offshore Barge"										
			Personnel	5									
GT-185 w/ adapter	MSRC (800) OIL-SPIIL	Port Arthur, TX	*Appropriate Vessel	2	1,371	0	Venice, LA	105	8	1	21	1	31
			*Temporary Storage	1									
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom	330'									
			"MSRC 401 Offshore Barge"										
Gulf Coast Responder Transrec-350	MSRC (800) OIL-SPIIL	Lake Charles, LA	Personnel	5	10,567	4,000	Lake Charles, LA	337	2	1	28	1	32
			*Appropriate Vessel	2									
			*Temporary Storage	1									
			Transrec Skimmer	1									
			Backup - Stress 1 Skimmer	1									
			67" Pressure Inflatable Boom	1320'									
			210' Vessel	1									
			Personnel	11									
			32' Support Boat	1									
			X Band Radar	1									
Infrared Camera	1												
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Leeville, LA	FAES #4 "Buster"	1	4,251	100	Port Fourchon, LA	125	4	12	15	2	33
			Foilex 250 Skimmer	1									
			Personnel	4									
			Utility Boat	1									
			53" Skimming Boom	75'									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1									
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Leeville, LA	Foilex 250 Skimmer	1	4,251	100	Port Fourchon, LA	125	4	12	15	2	33
			Personnel	4									
			Utility Boat	1									
			53" Skimming Boom	75'									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1									
			Fast Response Unit "FRU" 1.0	CGA (888) 242-2007									
Personnel	4												
* 100-140' Utility Boat	1												
53" Skimming Boom	75'												
** 67" Sea Sentry	440'												
** Crew Boat	1												
** Add'l Storage	1												
Walosep W-4	MSRC (800) OIL-SPIIL	Galveston, TX			Offshore Skimmer	1	3,017	0	Venice, LA	105	10	1	21
			67" Pressure Inflatable Boom	330'									
			Personnel	5									
			*Appropriate Vessel	2									
			*Temporary Storage	1									
FOILEX 250	MSRC (800) OIL-SPIIL	Galveston, TX	*Temporary Storage	1	3,977	0	Venice, LA	105	10	1	21	1	33
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom	330'									
			Personnel	5									
			*Appropriate Vessel	2									
GT-185 w/ adapter	MSRC (800) OIL-SPIIL	Galveston, TX	*Temporary Storage	1	1,371	0	Venice, LA	105	10	1	21	1	33
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom	330'									
			Personnel	5									
			*Appropriate Vessel	2									
Stress 1	MSRC (800) OIL-SPIIL	Galveston, TX	*Temporary Storage	1	15,840	0	Venice, LA	105	10	1	21	1	33
			Offshore Skimmer	1									
			"Texas Responder"										
			67" Pressure Inflatable Boom	330'									
			"MSRC 401 Offshore Barge"										
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Vermilion, LA	Personnel	5	4,251	100	Port Fourchon, LA	125	6.5	12	15	2	35.5
			*Appropriate Vessel	2									
			*Temporary Storage	1									
			Foilex 250 Skimmer	1									
			Personnel	4									
			Utility Boat	1									
			53" Skimming Boom	75'									
			** 67" Sea Sentry	440'									

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. * - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment. *** - Specific barge names may vary.													
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Vermilion, LA	Foilex 250 Skimmer	1	4,251	100	Port Fourchon, LA	125	6.5	12	15	2	35.5
			Personnel	4									
			Utility Boat	1									
			53" Skimming Boom	75'									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
Foilex 150 TDS	CGA (888) 242-2007	Vermilion, LA	** Add'l Storage	1	1,131	0	Port Fourchon, LA	125	6.5	12	15	2	35.5
			Weir Skimmer	1									
			Personnel	4									
			* Utility Boat (<100')	1									
			50 bbl Portable tank	1									
				50									
Stress 1	MSRC (800) OIL-SPIIL	Ingleside, TX	Offshore Skimmer	1	15,840	0	Venice, LA	105	13	1	21	1	36
			"Southern Responder"										
			67" Pressure Inflatable Boom	330'									
			"Gulf Coast Responder"										
			Personnel	5									
			* Appropriate Vessel	2									
Stress 1	MSRC (800) OIL-SPIIL	Tampa, FL	* Temporary Storage	1	15,840	0	Venice, LA	105	13	1	21	1	36
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom	330'									
			"Gulf Coast Responder"										
			Personnel	5									
			* Appropriate Vessel	2									
FOILEX 250	MSRC (800) OIL-SPIIL	Ingleside, TX	* Temporary Storage	1	3,977	0	Venice, LA	105	13	1	21	1	36
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom										
			"MSRC 402 - Offshore Barge"	330'									
			Personnel	5									
			* Appropriate Vessel	2									
Walosep W-4	MSRC (800) OIL-SPIIL	Ingleside, TX	* Temporary Storage	1	3,017	0	Venice, LA	105	13	1	21	1	36
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom	330'									
			"Gulf Coast Responder"										
			Personnel	5									
			* Appropriate Vessel	2									
CGA-200 HOSS Barge (OSRB)	CGA (888) 242-2007	Harvey, LA	* Temporary Storage	1	76,285	4,000	Harvey, LA	167	12	0	23	2	37
			Lamor Brush Skimmer	4									
			67" Sea Sentry	2640'									
			Personnel	12									
			* Tug - 1,200 HP	2									
			Oil Spill Detection System	1									
Texas Responder Transrec-350	MSRC (800) OIL-SPIIL	Galveston, TX	* Tug - 1,800 HP	1	10,567	4,000	Galveston, TX	392	2	1	33	1	37
			Transrec Skimmer	1									
			Backup - Stress 1 Skimmer	1									
			67" Pressure Inflatable Boom	2640'									
			210' Vessel	1									
			Personnel	11									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
			FAES #4 "Buster"	1									
DESMI OCEAN	MSRC (800) OIL-SPIIL	Miami, FL	Offshore Skimmer	1	3,017	100	Venice, LA	105	16	1	21	1	39
			67" Pressure Inflatable Boom	330'									
			Personnel	5									
			* Appropriate Vessel	2									
			* Temporary Storage	1									
			Offshore Skimmer	1									
Walosep W-4	MSRC (800) OIL-SPIIL	Miami, FL	67" Pressure Inflatable Boom	330'	3,017	100	Venice, LA	105	16	1	21	1	39
			Personnel	5									
			* Appropriate Vessel	2									
			* Temporary Storage	1									
			Offshore Skimmer	1									
			67" Pressure Inflatable Boom	330'									
GT-185 w/ adapter	MSRC (800) OIL-SPIIL	Miami, FL	Personnel	5	1,371	100	Venice, LA	105	16	1	21	1	39
			* Appropriate Vessel	2									
			* Temporary Storage	1									
			Offshore Skimmer	1									
			"Florida Responder"	1									
			67" Pressure Inflatable Boom										
Stress 1	MSRC (800) OIL-SPIIL	Miami, FL	"Gulf Coast Responder"	330'	15,840	0	Venice, LA	105	16	1	21	1	39
			Personnel	5									
			* Appropriate Vessel	2									
			* Temporary Storage	1									
			Offshore Skimmer	1									

Mississippi Canyon 778 - Drilling > 10 Miles Sample Offshore On-Water Recovery & Storage Activation List													
Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. * - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment. *** - Specific barge names may vary.													
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Galveston, TX	Foilex 250 Skimmer	1	4,251	100	Port Fourchon, LA	125	13.5	12	15	2	42.5
			Personnel	4									
			* 100-165' Utility Boat	1									
			53' Skimming Boom	75'									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
Foilex 150 TDS	CGA (888) 242-2007	Galveston, TX	Weir Skimmer	1	1,131	0	Port Fourchon, LA	125	13.5	12	15	2	42.5
			Personnel	4									
			* Utility Boat (<100')	1									
			50 bbl Portable tank	1									
PSV-VOO Skimming System (Brush)	MSRC (800) OIL-SPIIL	Lake Charles, LA	Lamor Brush Skimmer	1	18,086	0	Venice, LA	105	24	1	21	1	47
			67" Pressure Inflatable Boom	1320'									
			* PSV-VOO	1									
			Personnel	9									
			Thermal Infrared Camera	1									
			* Appropriate Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Brush)	MSRC (800) OIL-SPIIL	Lake Charles, LA	Lamor Brush Skimmer	1	18,086	0	Venice, LA	105	24	1	21	1	47
			67" Pressure Inflatable Boom	1320'									
			* PSV-VOO	1									
			Personnel	9									
			Thermal Infrared Camera	1									
			* Appropriate Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Transrec)	MSRC (800) OIL-SPIIL	Lake Charles, LA	Transrec 350 Skimmer	1	10,567	0	Venice, LA	105	24	1	21	1	47
			67" Pressure Inflatable Boom	1320'									
			* PSV-VOO	1									
			Personnel	9									
			Thermal Infrared Camera	1									
			* Appropriate Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Brush)	MSRC (800) OIL-SPIIL	Lake Charles, LA	Lamor Brush Skimmer	1	18,086	0	Venice, LA	105	24	1	21	1	47
			67" Pressure Inflatable Boom	1320'									
			* PSV-VOO	1									
			Personnel	9									
			Thermal Infrared Camera	1									
			* Appropriate Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Transrec)	MSRC (800) OIL-SPIIL	Lake Charles, LA	Transrec 350 Skimmer	1	10,567	0	Venice, LA	105	24	1	21	1	47
			67" Pressure Inflatable Boom	1320'									
			* PSV-VOO	1									
			Personnel	9									
			Thermal Infrared Camera	1									
			* Appropriate Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Brush)	MSRC (800) OIL-SPIIL	Houma, LA	Lamor Brush Skimmer	1	18,086	0	Venice, LA	105	24	1	21	1	47
			67" Pressure Inflatable Boom	1320'									
			* PSV-VOO	1									
			Personnel	9									
			Thermal Infrared Camera	1									
			* Appropriate Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIIL	Fort Jackson, LA	Crucial Disc Skimmer	1	11,122	0	Venice, LA	105	24	1	21	1	47
			67" Pressure Inflatable Boom	1320'									
			* PSV-VOO	1									
			Personnel	9									
			Thermal Infrared Camera	1									
			* Appropriate Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIIL	Fort Jackson, LA	Crucial Disc Skimmer	1	11,122	0	Venice, LA	105	24	1	21	1	47
			67" Pressure Inflatable Boom	1320'									
			* PSV-VOO	1									
			Personnel	9									
			Thermal Infrared Camera	1									
			* Appropriate Vessel	1									
			* Marine Portable Tank	2		1,000							
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Aransas Pass, TX	Foilex 250 Skimmer	1	4,251	100	Port Fourchon, LA	125	18.5	12	15	2	47.5
			Personnel	4									
			Utility Boat	1									
			53" Skimming Boom	75'									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. * - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment. *** - Specific barge names may vary.													
Southern Responder Transrec-350	MSRC (800) OIL-SPIIL	Ingleside, TX	Transrec Skimmer	1	10,567	4,000	Ingleside, TX	537	2	1	45	1	49
			Backup - Stress 1 Skimmer	1									
			67" Pressure Inflatable Boom	2640'									
			210' Vessel	1									
			Personnel	11									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
			FAES #4 "Buster"	1									
MSRC-360 Offshore Barge	MSRC (800) OIL-SPIIL	Tampa, FL	Offshore Barge	1	11,122	36,000	Tampa, FL	379	4	1	47.5	1	54
			67" Pressure Inflatable Boom	1320'									
			Crucial Disc Skimmer 88/30	1									
			Backup - Crucial Disc Skimmer 56/30	1									
			* Appropriate Vessel	1									
			Personnel	9									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
MSRC-570 Offshore Barge	MSRC (800) OIL-SPIIL	Galveston, TX	Offshore Barge	1	11,122	56,900	Galveston, TX	392	4	1	49	1	55
			67" Pressure Inflatable Boom	2640'									
			Crucial Disc Skimmer 88/30	1									
			Backup - Crucial Disc Skimmer 88/30	1									
			* Appropriate Vessel	1									
			Personnel	9									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
Florida Responder Transrec-350	MSRC (800) OIL-SPIIL	Miami, FL	Transrec Skimmer	1	10,567	4,000	Miami, FL	635	2	1	53	1	57
			Backup - Stress 1 Skimmer	1									
			67" Pressure Inflatable Boom	2640'									
			210' Vessel	1									
			Personnel	11									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
			FAES #4 "Buster"	1									
Koseq Skimming Arms (6a) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0 6,000	Port Fourchon, LA	125	24	24	13	2	63
			Personnel	4									
			* Offshore vessel (>200')	1									
			* Combined Onboard Storage	1									
Koseq Skimming Arms (6b) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0 6,000	Port Fourchon, LA	125	24	24	13	2	63
			Personnel	4									
			* Offshore vessel (>200')	1									
			* Combined Onboard Storage	1									
Koseq Skimming Arms (7a) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0 6,000	Port Fourchon, LA	125	24	24	13	2	63
			Personnel	4									
			* Offshore vessel (>200')	1									
			* Combined Onboard Storage	1									
Koseq Skimming Arms (7b) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0 6,000	Port Fourchon, LA	125	24	24	13	2	63
			Personnel	4									
			* Offshore vessel (>200')	1									
			* Combined Onboard Storage	1									
Koseq Skimming Arms (8a) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0 6,000	Port Fourchon, LA	125	24	24	13	2	63
			Personnel	4									
			* Offshore vessel (>200')	1									
			* Combined Onboard Storage	1									
Koseq Skimming Arms (8b) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0 6,000	Port Fourchon, LA	125	24	24	13	2	63
			Personnel	4									
			* Offshore vessel (>200')	1									
			* Combined Onboard Storage	1									
Koseq Skimming Arms (9a) (Lamor Brush)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	22,885	0 6,000	Port Fourchon, LA	125	24	24	13	2	63
			Personnel	4									
			* Offshore vessel (>200')	1									
			* Combined Onboard Storage	1									
Koseq Skimming Arms (9b) (Lamor Brush)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	22,885	0 6,000	Port Fourchon, LA	125	24	24	13	2	63
			Personnel	4									
			* Offshore vessel (>200')	1									
			* Combined Onboard Storage	1									

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles														
Sample Offshore On-Water Recovery & Storage Activation List														
Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)					Total ETA
									Staging ETA	Loadout Time	ETA to Site	Deployment Time		
Note: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability.														
* - These components are additional operational requirements that must be procured in addition to the system identified.														
** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.														
*** - Specific barge names may vary.														
Koseq Skimming Arms (10a) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0	Port Fourchon, LA	125	24	24	13	2	63	
			Personnel	4										
			* Offshore vessel (>200')	1										
			* Combined Onboard Storage	1										
Koseq Skimming Arms (10b) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0	Port Fourchon, LA	125	24	24	13	2	63	
			Personnel	4										
			* Offshore vessel (>200')	1										
			* Combined Onboard Storage	1										
Koseq Skimming Arms (11a) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0	Port Fourchon, LA	125	24	24	13	2	63	
			Personnel	4										
			* Offshore vessel (>200')	1										
			* Combined Onboard Storage	1										
Koseq Skimming Arms (11b) (Mariflex Weir)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	1	18,163	0	Port Fourchon, LA	125	24	24	13	2	63	
			Personnel	4										
			* Offshore vessel (>200')	1										
			* Combined Onboard Storage	1										
MSRC-403 Offshore Barge	MSRC (800) OIL-SPIIL	Ingleside, TX	Offshore Barge	1	11,122	40,300	Ingleside, TX	537	4	1	67	1	73	
			67" Pressure Inflatable Boom	2640'										
			Crucial Disc Skimmer 88/30	1										
			Backup - Crucial Disc Skimmer 56/30	1										
			* Appropriate Vessel	1										
			Personnel	9										
			* Offshore Tug	2										
			X Band Radar	1										
Infrared Camera	1													
***Moran/ Long Island	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	62,982	Houma, LA	182	24-72	0	22.5	1	48 to 96	
			Personnel	4										
			Offshore Tug	1										
***Moran/ Tennessee	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	82,022	Houma, LA	182	24-72	0	22.5	1	48 to 96	
			Personnel	4										
			Offshore Tug	1										
***Moran/ New Hampshire	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	118,836	Houma, LA	182	24-72	0	22.5	1	48 to 96	
			Personnel	4										
			Offshore Tug	1										
***K-Sea DBL 101 Offshore Barge	CGA (888) 242-2007	Belle Chasse, LA	Offshore Barge	1	N/A	107,285	Houma, LA	182	24-72	0	22.5	1	48 to 96	
			Personnel	10										
			* Offshore Tug	1										
***K-Sea DBL 102 Offshore Barge	CGA (888) 242-2007	Belle Chasse, LA	Offshore Barge	1	N/A	107,285	Houma, LA	182	24-72	0	22.5	1	48 to 96	
			Personnel	10										
			* Offshore Tug	1										
***Moran/ Massachusetts	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	137,123	Houma, LA	182	24-72	0	22.5	1	48 to 96	
			Personnel	4										
			Offshore Tug	1										
***CTCo-5001 Offshore Barge	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	47,000	Morgan City, LA	222	24-72	0	27	1	52 to 100	
			Personnel	4										
			Offshore Tug	1										
***CTCo-2606 Offshore Barge	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	20,000	Morgan City, LA	222	24-72	0	27	1	52 to 100	
			Personnel	4										
			Offshore Tug	1										
DERATED RECOVERY RATE (BBLs/DAY)													860,917	
STORAGE CAPACITY INCLUDING SKIMMING VESSELS (BARRELS)													1,013,679	

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles Sample Nearshore On-Water Recovery Activation List													
Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC In Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Nearshore Environment (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Nearshore Environment	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. NOTE: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. *** - Specific barge names may vary.													
SWS CGA-77 FRV	CGA (888) 242-2007	Venice, LA	Lori Brush Skimmer	2	22,885	249	Venice, LA	56	2	0	4	1	7
			36" Boom	34'									
			60' Vessel	1									
			Personnel	4									
SW CGA-73 FRV	CGA (888) 242-2007	Venice, LA	Marco Belt Skimmer	2	21,500	249	Venice, LA	56	2	0	4	1	7
			36" Boom	150'									
			Personnel	5									
			56' SWS Vessel	1									
FRV M/V Grand Bay	CGA (888) 242-2007	Venice, LA	* 20'+ Alum. Flatboat	2	15,257	65	Venice, LA	56	2	0	6	1	9
			Lori Brush Skimmer	2									
			36" Boom	46'									
			46' Vessel	1									
SWS CGA-76 FRV	CGA (888) 242-2007	Leeville, LA	Personnel	4	22,885	249	Leeville, LA	90	2	0	6	1	9
			Lori Brush Skimmer	2									
			36" Boom	34'									
			60' Vessel	1									
SW CGA-72 FRV	CGA (888) 242-2007	Leeville, LA	Personnel	4	21,500	249	Leeville, LA	90	2	0	6	1	9
			Marco Belt Skimmer	2									
			36" Boom	150'									
			56' SWS Vessel	1									
FRV M/V RW Armstrong	CGA (888) 242-2007	Leeville, LA	* 20'+ Alum. Flatboat	2	15,257	65	Leeville, LA	90	2	0	8	1	11
			Lori Brush Skimmer	2									
			36" Boom	46'									
			46' Vessel	1									
MSRC "Quick Strike"	MSRC (800) OIL-SPIL	Lake Charles, LA	Personnel	4	5,000	50	Lake Charles, LA	305	2	1	12	1	16
			LORI Brush Skimmer	2									
			Personnel	3									
			47' Fast Response Vessel	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Belle Chasse, LA	Skimmer	1	905	400	Venice, LA	56	4	1	11	1	17
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Belle Chasse, LA	Push Boat	1	3,588	24	Venice, LA	56	4	1	11	1	17
			Marco I Skimmer	1									
			Personnel	2									
			30' Shallow Water Vessel	1									
SWS CGA-52 MARCO Shallow Water Skimmer	CGA (888) 242-2007	Venice, LA	Skimmer	1	3,588	34	Venice, LA	56	4	6	6	1	17
			* 18" Boom (contractor)	100'									
			Personnel	3									
			36' Skimming Vessel	1									
FRV M/V Bastian Bay	CGA (888) 242-2007	Vermilion, LA	Lori Brush Skimmer	2	15,257	65	Vermilion, LA	259	2	0	15	1	18
			36" Boom	46'									
			46' Vessel	1									
			Personnel	4									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Pascagoula, MS	Marco I Skimmer	1	3,588	24	Venice, LA	56	5.5	1	11	1	19
			Personnel	2									
			30' Shallow Water Vessel	1									
			Skimmer	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Pascagoula, MS	Skimmer	1	905	400	Venice, LA	56	5.5	1	11	1	19
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
AARDVAC	MSRC (800) OIL-SPIL	Pascagoula, MS	Push Boat	1	3,840	500	Venice, LA	56	6	1	11	1	19
			Skimmer	1									
			18" Boom	50'									
			Personnel	5									
SBS w/ GT-185 w/adpater	MSRC (800) OIL-SPIL	Pascagoula, MS	* Appropriate Vessel	2	1,371	400	Venice, LA	56	5.5	1	11	1	19
			* Temporary Storage	1									
			Skimmer	1									
			18" Boom	50'									
WP-1	MSRC (800) OIL-SPIL	Pascagoula, MS	Personnel	4	3,017	0	Venice, LA	56	5.5	1	11	1	19
			Self-propelled barge	1									
			Skimmer	1									
			18" Boom	50'									
			Personnel	5									
			*Appropriate Vessel	2									
			*Temporary Storage	1		500							

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Nearshore Environment (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Nearshore Environment	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. NOTE: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. *** - Specific barge names may vary.													
SW CGA-74 FRV	CGA (888) 242-2007	Vermilion, LA	Marco Belt Skimmer	2	21,500	249	Vermilion, LA	256	2	0	17	1	20
			36" Boom	150'									
			Personnel	4									
			56' SW Vessel	1									
			* 20'+ Alum. Flatboat	2									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer	1	1,371	400	Venice, LA	56	7	1	11	1	20
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			Push Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer	1	905	400	Venice, LA	56	7	1	11	1	20
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			Push Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer	1	905	400	Venice, LA	56	7	1	11	1	20
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			Push Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer	1	905	400	Venice, LA	56	7	1	11	1	20
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			* Appropriate Vessel	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer	1	905	400	Venice, LA	56	7	1	11	1	20
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			Self-propelled barge	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer	1	905	400	Venice, LA	56	7	1	11	1	20
			18" Boom	50'									
			Personnel	4									
			Self-propelled barge	1									
			Push Boat	1									
SWS CGA-53 MARCO Shallow Water Skimmer	CGA (888) 242-2007	Leeville, LA	Marco Belt Skimmer	1	3,588	34	Venice, LA	56	8	6	6	1	21
			* 18" Boom (contractor)	100'									
			Personnel	3									
			38' Skimming Vessel	1									
			Push Boat	1									
SWS CGA-51 MARCO Shallow Water Skimmer	CGA (888) 242-2007	Vermilion, LA	Marco Belt Skimmer	1	3,588	20	Venice, LA	56	8	6	6	1	21
			* 18" Boom (contractor)	100'									
			Personnel	3									
			34' Skimming Vessel	1									
			Push Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Galveston, TX	Skimmer	1	905	400	Venice, LA	56	9.5	1	11	1	23
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			Push Boat	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Galveston, TX	Skimmer	1	1,371	400	Venice, LA	56	9.5	1	11	1	23
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			Push Boat	1									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Galveston, TX	Marco I Skimmer	1	3,588	24	Venice, LA	56	9.5	1	11	1	23
			Personnel	2									
			30' Shallow Water Vessel	1									
			Push Boat	1									
			Push Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Memphis, TN	Skimmer	1	905	400	Venice, LA	56	9.5	1	11	1	23
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			Push Boat	1									
SWS CGA-75 FRV	CGA (888) 242-2007	Galveston, TX	Lori Brush Skimmer	2	22,885	249	Galveston, TX	355	2	0	21	1	24
			36" Boom	34'									
			60' Vessel	1									
			Personnel	4									
			LORI Brush Skimmer	2									
MSRC "Lightning"	MSRC (800) OIL-SPIL	Tampa, FL	Personnel	3	5,000	50	Tampa, FL	505	2	1	20	1	24
			47' Fast Response Vessel	1									

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Nearshore Environment (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Nearshore Environment	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. NOTE: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. *** - Specific barge names may vary.													
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Jacksonville, FL	Skimmer	1	1,371	400	Venice, LA	56	12	1	11	1	25
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Ingleside, TX	* Appropriate Vessel	1	3,588	24	Venice, LA	56	12.25	1	11	1	26
			Marco I Skimmer	1									
			Personnel	2									
			30' Shallow Water Vessel	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Ingleside, TX	Skimmer	1	1,371	400	Venice, LA	56	12.25	1	11	1	26
			18" Boom	50'									
			Personnel	4									
			Self-propelled barge	1									
WP-1	MSRC (800) OIL-SPIL	Tampa, FL	Skimmer	1	3,017	0	Venice, LA	56	13	1	11	1	26
			18" Boom	50'									
			Personnel	5		500							
			*Appropriate Vessel	2									
			*Temporary Storage	1									
			SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL									
18" Boom	50'												
Personnel	4												
Non-Self-Propelled Barge	1												
Push Boat	1												
Skimmer	1												
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Savannah, GA	18" Boom	50'	1,371	400	Venice, LA	56	13.5	1	11	1	27
			Personnel	4									
			Non-Self-Propelled Barge	1									
			*Appropriate Vessel	1									
			Skimmer	1									
			18" Boom	50'									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Roxana, IL	Personnel	4	905	400	Venice, LA	56	14	1	11	1	27
			Non-Self-Propelled Barge	1									
			Push Boat	1									
			Skimmer	1									
			18" Boom	50'									
			SWS CGA-55 Egmpol Shallow Water Skimmer	CGA (888) 242-2007									
* 18" Boom (contractor)	100'												
Personnel	3												
AARDVAC	MSRC (800) OIL-SPIL	Miami, FL	38' Skimming Vessel	1	3,840	500	Venice, LA	56	16	1	11	1	29
			Skimmer	1									
			18" Boom	50'									
			Personnel	5		500							
			* Appropriate Vessel	2									
			* Temporary Storage	1									
AARDVAC	MSRC (800) OIL-SPIL	Miami, FL	Skimmer	1	3,840	500	Venice, LA	56	16	1	11	1	29
			18" Boom	50'									
			Personnel	5									
			* Appropriate Vessel	2		500							
			* Temporary Storage	1									
			WP-1	MSRC (800) OIL-SPIL									
18" Boom	50'												
Personnel	5												
* Appropriate Vessel	2	500											
* Temporary Storage	1												
MSRC "Kvichak"	MSRC (800) OIL-SPIL				Miami, FL	Marco I Skimmer	1	3,588	24	Venice, LA	56	16	1
		Personnel	2										
		30' Shallow Water Vessel	1										
		Skimmer	1										
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Whiting, IN	18" Boom	50'	905	400	Venice, LA	56	17.25	1	11	1	31
			Personnel	4									
			Non-Self-Propelled Barge	1									
			Push Boat	1									
			Skimmer	1									
			18" Boom	50'									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Toledo, OH	Personnel	4	905	400	Venice, LA	56	18.5	1	11	1	32
			Non-Self-Propelled Barge	1									
			Push Boat	1									
			Skimmer	1									
			18" Boom	50'									
			Marco I Skimmer	1									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Chesapeake, VA	Personnel	2	3,588	24	Venice, LA	56	19.25	1	11	1	33
			30' Shallow Water Vessel	1									
			Skimmer	1									
			18" Boom	50'									

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Nearshore Environment (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Nearshore Environment	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. NOTE: Total ETA might be effected by weather, sea state, lock closure, 3rd party vessel availability. *** - Specific barge names may vary.													
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Chesapeake, VA	Skimmer	1	1,371	400	Venice, LA	56	19	1	11	1	33
			18" Boom	50'									
			Personnel	4									
			Self-propelled barge	1									
SW CGA-71 FRV	CGA (888) 242-2007	Aransas Pass, TX	Marco Belt Skimmer	2	21,500	249	Aransas Pass, TX	531	2	0	31	1	34
			36" Boom	150'									
			Personnel	5									
			56' SWS Vessel	1									
			* 20'+ Alum. Flatboat	2									
FRV CGA 58 Timbalier Bay	CGA (888) 242-2007	Aransas Pass, TX	Lori Brush Skimmer	2	15,257	65	Aransas Pass, TX	531	2	0	31	1	34
			36" Boom	46'									
			46' Vessel	1									
			Personnel	4									
CGA-54 Egmopol Shallow Water Skimmer	CGA (888) 242-2007	Galveston, TX	Marco Belt Skimmer	1	1,810	100	Venice, LA	56	14	6	14	1	35
			* 18" Boom (contractor)	100'									
			Personnel	3									
			34' Skimming Vessel	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Chesapeake City, MD	Skimmer	1	1,371	400	Venice, LA	56	21.25	1	11	1	35
			18" Boom	50'									
			Personnel	4									
			Self-Propelled Barge	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Skimmer	1	1,371	400	Venice, LA	56	23	1	11	1	36
			18" Boom	50'									
			Personnel	4									
			Self-propelled barge	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Bayonne, NJ	Skimmer	1	1,371	400	Venice, LA	56	22.75	1	11	1	36
			18" Curtain Internal Foam	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
			*Appropriate Vessel	1									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Marco I Skimmer	1	3,588	24	Venice, LA	56	22.75	1	11	1	36
			Personnel	2									
			30' Shallow Water Vessel	1									
				1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Providence, RI	Skimmer	1	1,371	400	Venice, LA	56	26	1	11	1	39
			18" Curtain Internal Foam	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Everett, MA	Push Boat	1	1,371	400	Venice, LA	56	26	1	11	1	39
			Skimmer	1									
			18" Boom	50'									
			Personnel	4									
			Non-Self-Propelled Barge	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Portland, ME	Push Boat	1	1,371	400	Venice, LA	56	28	1	11	1	41
			Skimmer	1									
			18" Boom	50'									
			Personnel	4									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Portland, ME	Self-Propelled Barge	1	3,588	24	Venice, LA	56	28	1	11	1	41
			Marco I Skimmer	1									
			Personnel	2									
			30' Shallow Water Vessel	1									
***Moran/ Conneticut	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	41,454	Houma, LA	182	24-72	0	22.5	1	48 to 96
			Personnel	4									
			Offshore Tug	1									
			Offshore Barge	1									
***Moran/ Portland	CGA (888) 242-2007	Houma, LA	Offshore Tug	1	N/A	91,443	Houma, LA	182	24-72	0	22.5	1	48 to 96
			Personnel	4									
			Offshore Tug	1									
			Offshore Barge	1									
***Moran/ Georgia	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	118,794	Houma, LA	182	24-72	0	22.5	1	48 to 96
			Personnel	4									
			Offshore Tug	1									
			Offshore Barge	1									
***Moran/ Charleston	CGA (888) 242-2007	Houma, LA	Offshore Tug	1	N/A	118,638	Houma, LA	182	24-72	0	22.5	1	48 to 96
			Personnel	4									
			Offshore Tug	1									
			Offshore Barge	1									
***Moran/ Philadelphia	CGA (888) 242-2007	Houma, LA	Offshore Barge	1	N/A	118,694	Houma, LA	182	24-72	0	22.5	1	48 to 96
			Personnel	4									
			Offshore Tug	1									
			Offshore Barge	1									
DERATED RECOVERY RATE (BBLs/DAY)									319,396				
SKIMMING VESSEL STORAGE CAPACITY (BARRELS)									505,006				

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
AMPOL (800) 482-6765	Harvey, LA	Containment Boom - 18" to 24"	8,000'	Venice, LA	4	1	1	6
		Containment Boom - 6" to 10"	3,000'					
ES&H Environmental (877) 437-2634	Belle Chasse, LA	Containment Boom - 10"	1,500'	Venice, LA	4	1	1	6
		Containment Boom - 18"	15,500'					
		Containment Boom - 24"	5,000'					
		Jon Boat - 12' to 16'	4					
		Response Boats - 18' to 21'	1					
		Response Boats - 22' to 25'	1					
		Response Boats - 26' to 29'	3					
		Portable Skimmers	10					
	Belle Chasse, LA	Wildlife Hazing Cannon	50	Venice, LA	4	1	1	6
		Containment Boom - 18" to 24"	4,500'					
		Containment Boom - 6" to 10"	500'					
		Response Boats - 20'	1					
		Response Boats - 25' to 28'	2					
		Portable Skimmers	12					
		Shallow Water Skimmers	1					
		Bird Scare Cannons	12					
USES Environmental (888) 279-9930	Marrero, LA	Response Personnel	24	Venice, LA	4	1	1	6
		Containment Boom - 18"	600'					
AMPOL (800) 482-6765	Venice, LA	Containment Boom - 18" to 24"	2,250'	Venice, LA	4	1	1	6
		Response Boats - 14' to 20'	2					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	2					
USES Environmental (888) 279-9930	Venice, LA	Containment Boom - 18"	10,000'	Venice, LA	4	1	1	6
		Response Boats - 16'	15					
		Response Boats - 26'	2					
		Response Boats - 30'	1					
		Portable Skimmers	2					
		Shallow Water Skimmers	1					
ES&H Environmental (877) 437-2634	Venice, LA	Containment Boom - 10"	2,000'	Venice, LA	4	1	1	6
		Containment Boom - 18"	13,000'					
		Containment Boom - 24"	10,000					
		Jon Boat - 12' to 16'	4					
		Response Boats - 22' to 25'	1					
		Response Boats - 26' to 29'	2					
		Portable Skimmers	5					
		Wildlife Hazing Cannon	25					

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
OMI (800) 645-6671	Venice, LA	Containment Boom - 18" to 24"	1,500'	Venice, LA	4	1	1	6
		Response Boats - 16'	4					
		Response Boats (Barge) - 25' to 33'	1					
		Response Boats - 25' to 28'	2					
		Response Boats - (Cabin Boat) 27' to 30'	1					
		Shallow Water Skimmers	3					
		Portable Skimmers	2					
USES Environmental (888) 279-9930	Meraux, LA	Containment Boom - 18"	6,000'	Venice, LA	4	1	1	6
		Containment Boom - 10"	1,000'					
		Response Boats - 16'	23					
		Response Boats - 18'	1					
		Response Boats - 24'	1					
		Response Boats - 26'	2					
		Response Boats - 28'	1					
		Portable Skimmers	2					
Wildlife Ctr. of Texas (713) 861-9453	Baton Rouge, LA	Wildlife Specialist - Personnel	6 to 20	Venice, LA	5	1	1	7
Clean Harbors (800) 645-8265	Baton Rouge, LA	Containment Boom - 18" to 24"	14,000'	Venice, LA	5	1	1	7
		Response Boats - 14' to 20'	1					
		Portable Skimmers	3					
		Response Personnel	13					
OMI (800) 645-6671	Port Allen, LA	Containment Boom - 18" to 24"	2500'	Venice, LA	5	1	1	7
		Containment Boom - 6" to 10"	500'					
		Response Boats - 16'	2					
		Response Boats - 25 to 33'	1					
		Shallow Water Skimmers	1					
		Response Personnel	6					
OMI (985) 798-1005	Houma, LA	Containment Boom - 18" to 24"	2,000'	Venice, LA	5	1	1	7
		Containment Boom - 6" to 10"	500'					
		Response Boats - 16'	2					
		Response Boats - 25' to 28'	1					
		Response Boats - (Cabin Boat) 27' to 30'	1					
		Shallow Water Skimmers	3					
ES&H Environmental (877) 437-2634	Houma, LA	Containment Boom - 10"	2,000'	Venice, LA	5	1	1	7
		Containment Boom - 18"	20,000'					
		Containment Boom - 24"	5,000'					
		Jon Boat - 12' to 16'	30					
		Response Boats - 22' to 25'	2					
		Response Boats - 26' to 29'	4					
		Portable Skimmers	23					
		Shallow Water Skimmers	2					
		Wildlife Hazing Cannon	57					

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
OMI (800) 645-6671	Galliano, LA	Containment Boom - 18" to 24"	2,000'	Venice, LA	5	1	1	7
		Containment Boom - 6" to 10"	500'					
		Response Boats - 16'	1					
		Response Boats (Barge) - 25' to 33'	1					
		Response Boats - 25' to 28'	1					
		Portable Skimmers	3					
OMI (800) 645-6671	Morgan City, LA	Containment Boom - 18" to 24"	2,500	Venice, LA	5	1	1	7
		Containment Boom - 6" to 10"	400'					
		Response Boats - 16'	2					
		Response Boats - 25' to 28'	1					
		Portable Skimmers	3					
		Response Personnel	3					
ES&H Environmental (877) 437-2634	Morgan City, LA	Containment Boom - 10"	2,000'	Venice, LA	5	1	1	7
		Containment Boom - 18"	500'					
		Jon Boat - 12' to 16'	3					
		Response Boats - 18' to 21'	2					
		Response Boats - 22' to 25'	1					
		Portable Skimmers	2					
USES Environmental (888) 279-9930	Hahnville, LA	Containment Boom - 18"	500'	Venice, LA	5	1	1	7
USES Environmental (888) 279-9930	Amelia, LA	Containment Boom - 18"	500'	Venice, LA	5	1	1	7
USES Environmental (888) 279-9930	Lafitte, LA	Containment Boom - 18"	1,000'	Venice, LA	5	1	1	7
		Response Boats - 18'	2					
USES Environmental (888) 534-2744	Geismar, LA	Containment Boom - 18"	1,000'	Venice, LA	5	1	1	7
		Response Boats - 16'	2					
		Portable Skimmers	1					
USES Environmental (888) 279-9930	Biloxi, MS	Containment Boom - 18"	2,000'	Venice, LA	5	1	1	7
		Response Boats - 16'	1					
CGA (888) 242-2007	Harvey, LA	Wildlife Rehab Trailer	1	Venice, LA	4	1	3	8
		Wildlife Husbandry Trailer	1					
		Support Trailer	3					
		Bird Scare Cannons	120					
		Contract Truck (Third Party)	3					
		Personnel (Responder/Mechanic)	4					
ES&H Environmental (877) 437-2634	Port Fourchon, LA	Containment Boom - 18"	1000'	Venice, LA	6	1	1	8
		Response Boats - 22' to 25'	1					
		Portable Skimmers	1					

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
AMPOL (800) 482-6765	New Iberia, LA	Containment Boom - 6" to 10"	4,150'	Venice, LA	6	1	1	8
		Containment Boom - 18" to 24"	34,050'					
		Response Boats - 14' to 20'	3					
		Response Boats - 21' to 36'	3					
		Portable Skimmers	27					
Clean Harbors (800) 645-8265	New Iberia, LA	Containment Boom - 18" to 24"	33,800'	Venice, LA	6	1	1	8
		Containment Boom - 6" to 10"	500'					
		Response Boats - 21' to 36'	4					
OMI (800) 645-6671	New Iberia, LA	Containment Boom - 18" to 24"	12,000'	Venice, LA	6	1	1	8
		Containment Boom - 6" to 10"	300'					
		Response Boats - 16'	3					
		Response Boats (Barge) - 25' to 33'	1					
		Response Boats - 25' to 28'	1					
		Portable Skimmers	8					
		Response Personnel	8					
ES&H Environmental (877) 437-2634	Golden Meadow, LA	Containment Boom - 10"	1,000'	Venice, LA	6	1	1	8
		Containment Boom - 18"	13,000					
		Jon Boat - 12' to 16'	2					
		Response Boats - 18' to 21'	1					
		Response Boats - 22' to 25'	1					
		Response Boats - 26' to 29'	1					
		Portable Skimmers	5					
		Wildlife Hazing Cannon	12					
ES&H Environmental (877) 437-2634	Lafayette, LA	Containment Boom - 10"	500'	Venice, LA	6	1	1	8
		Containment Boom - 18"	13,000'					
		Jon Boat - 12' to 16'	3					
		Response Boats - 18' to 21'	1					
		Response Boats - 22' to 25'	1					
		Response Boats - 26' to 29'	1					
		Portable Skimmers	4					
		Wildlife Hazing Cannon	12					
USES Environmental (888) 279-9930	Jackson, MS	Containment Boom - 10"	400'	Venice, LA	6	1	1	8
		Containment Boom - 18"	2,000'					
		Response Boats - 12'	3					
		Response Boats - 14'	1					
		Response Boats - 16'	1					
		Response Boats - 18'	1					
		Response Boats - 20'	1					
		Portable Skimmers	2					

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
USES Environmental (888) 279-9930	Mobile, AL	Containment Boom - 10"	800'	Venice, LA	6	1	1	8
		Containment Boom - 18"	5,000'					
		Response Boats - 16'	1					
		Response Boats - 18'	1					
		Response Boats - 20'	1					
		Response Boats - 26'	1					
		Portable Skimmers	2					
USES Environmental (888) 279-9930	Lake Charles, LA	Containment Boom - 10"	100'	Venice, LA	7	1	1	9
		Containment Boom - 18"	7,700'					
		Response Boats - 16'	3					
		Response Boats - 27'	1					
		Response Boats - 37'	1					
MSRC (800) OIL-SPIL	Lake Charles, LA	Wildlife Trailer	1	Venice, LA	7	1	1	9
		Contract Truck (Third Party)	1					
		Personnel (Responder/Mechanic)	1					
ES&H Environmental (877) 437-2634	Lake Charles, LA	Containment Boom - 10"	500'	Venice, LA	7	1	1	9
		Containment Boom - 18"	15,000'					
		Containment Boom - 24"	5,000'					
		Jon Boat - 12' to 16'	3					
		Response Boats - 18' to 21'	2					
		Response Boats - 26' to 29'	2					
		Portable Skimmers	13					
		Wildlife Hazing Cannon	40					
Miller Env. Services (800) 929-7227	Sulphur, LA	Containment Boom - 10"	600'	Venice, LA	7	1	1	9
		Containment Boom - 18"	14,000'					
		Jon Boats - 14' to 16'	2					
		Jon Boats - 16'	2					
		Air Boat - 18'	1					
		Work Boat - 18'	2					
		Response Boats - 24' - 28'	4					
		Portable Skimmers	5					
		Shallow Water Skimmers	1					
		Response Personnel	49					
AMPOL (800) 482-6765	Port Arthur, TX	Containment Boom - 18" to 24"	16,000'	Venice, LA	8	1	1	10
		Response Boats - 14' to 20'	2					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	3					
Clean Harbors (800) 645-8265	Port Arthur, TX	Containment Boom - 18" to 24"	3,000'	Venice, LA	8	1	1	10
		Response Boats - 21' to 36'	2					
		Portable Skimmers	2					
		Response Personnel	54					
Garner Environmental (800) 424-1716	Port Arthur, TX	Containment Boom - 6"	22,000'	Venice, LA	8	1	1	10
		Response Boats - 14' to 20'	8					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	3					

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
OMI (800) 645-6671	Port Arthur, TX	Containment Boom - 18" to 24"	4000'	Venice, LA	8	1	1	10
		Response Boats - 14' to 20'	6					
		Response Boats - 21' to 36'	2					
		Shallow Water Skimmers	1					
Miller Env. Services (800) 929-7227	Beaumont, TX	Containment Boom - 18"	14,000'	Venice, LA	8	1	1	10
		Response Boats - 18'	2					
		Response Boats - 24'	2					
		Shallow Water Skimmers	1					
		Response Personnel	47					
USES Environmental (888) 279-9930	Shreveport, LA	Containment Boom - 6"	500'	Venice, LA	8	1	1	10
		Containment Boom - 18"	2,000'					
		Response Boats - 16'	1					
		Response Boats - 24'	1					
		Shallow Water Skimmers	1					
Phoenix Pollution Control & Environmental Services (281) 838-3400	Baytown, TX	Containment Boom - 18"	13,000'	Venice, LA	8.75	1	1	11
		Containment Boom - 10"	1,150'					
		Response Boats - 16'	6					
		Response Boats - 20'	3					
		Response Boats - 24'	1					
		Response Boats - 35'	2					
		Portable Skimmers	24					
Wildlife Ctr. of Texas (713) 861-9453	Houston, TX	Wildlife Specialist - Personnel	6 to 20	Venice, LA	9	1	1	11
USES Environmental (888) 279-9930	Houston, TX	Containment - 18"	10,000'	Venice, LA	9	1	1	11
		Response Boats - 16'	4					
		Response Boats - 26'	1					
		Portable Skimmers	1					
Clean Harbors (800) 645-8265	Houston, TX	Containment Boom - 18" to 24"	4,500'	Venice, LA	9	1	1	11
		Response Boats - 14' to 20'	2					
		Response Boats - 21' to 36'	3					
		Portable Skimmers	1					
		Response Personnel	14					
ES&H Environmental (877) 437-2634	Houston, TX	Containment Boom - 10"	500'	Venice, LA	9	1	1	11
		Containment Boom - 18"	13,000'					
		Containment Boom - 24"	5,000'					
		Jon Boat - 12' to 16'	2					
		Response Boats - 26' to 29'	2					
		Portable Skimmers	2					
		Wildlife Hazing Cannon	12					
Miller Env. Services (800) 929-7227	Houston, TX	Containment Boom - 18"	12,000'	Venice, LA	9	1	1	11
		Shallow Water Skimmers	1					
		Response Boats - 28'	1					
		Responder Personnel	38					

07/20/2022

Mississippi Canyon 778 - Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
OMI (800) 645-6671	Houston, TX	Containment Boom - 18" to 24"	4000'	Venice, LA	9	1	1	11
		Response Boats - 16'	3					
		Response Boats - 25' to 28'	1					
		Portable Skimmers	1					
Garner Environmental (800) 424-1716	Deer Park, TX	Containment Boom - 18"	16,000'	Venice, LA	9	1	1	11
		Response Boats - 12'	2					
		Response Boats - 16' to 20'	5					
		Response Boats - 30'	2					
		Portable Skimmers	13					
Garner Environmental (800) 424-1716	La Marque, TX	Containment Boom - 6"	9,500'	Venice, LA	10	1	1	12
		Response Boats - 16'	5					
		Response Boats - 24'	1					
		Portable Skimmers	7					
USES Environmental (888) 279-9930	Memphis, TN	Containment Boom - 6"	850'	Venice, LA	10	1	1	12
		Containment Boom - 12"	300'					
		Containment Boom - 18"	5,000'					
		Response Boats - 12'	3					
		Response Boats - 14'	5					
		Response Boats - 16'	2					
		Response Boats - 24'	1					
		Response Boats - 28'	1					
Miller Env. Services (800) 929-7227	Corpus Christi, TX	Portable Skimmers	2	Venice, LA	13	1	1	15
		Containment Boom - 10"	2,000'					
		Containment Boom - 18"	30,000'					
		Jon Boats - 14' to 16'	4					
		Jon Boats - 16' to 18'	4					
		Air Boat - 14'	1					
		Response Boats - 24' to 26'	4					
		Portable Skimmers	6					
Shallow Water Skimmers			2					
		Response Personnel	142					
Tri-State Bird Rescue & Research, Inc. (800) 261-0980	Newark, DE	Wildlife Specialist - Personnel	6 to 12	Venice, LA	21	1	1	23

07/20/2022

Appendix I: Environmental Impact Analysis (EIA)

Title of Document:	Thunder Horse Field Revised DOCD	Document Number:	
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Environmental Impact Analysis

for a

SUPPLEMENTAL DEVELOPMENT OPERATIONS AND COORDINATION DOCUMENT

for

Mississippi Canyon Block 778 (OCS-G 09868)

Offshore Louisiana and Mississippi

January 2026

Prepared for:

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Contents

List of Tables.....	iv
List of Figures.....	v
Acronyms and Abbreviations	vi
Introduction	1
A. Impact-Producing Factors	7
A.1 Installation Vessel Presence, Marine Sound, and Lights	7
A.2 Physical Disturbance to the Seafloor.....	12
A.3 Air Pollutant Emissions	12
A.4 Effluent Discharges	12
A.5 Water Intake.....	12
A.6 Onshore Waste Disposal.....	13
A.7 Marine Debris	13
A.8 Support Vessel and Helicopter Traffic	13
A.9 Accidents	15
A.9.1 Small Fuel Spill	16
A.9.2 Large Oil Spill (Worst Case Discharge)	18
B. Affected Environment.....	22
C. Impact Analysis.....	24
C.1 Physical/Chemical Environment	24
C.1.1 Air Quality	24
C.1.2 Water Quality.....	26
C.2 Seafloor Habitats and Biota	29
C.2.1 Soft Bottom Benthic Communities	29
C.2.2 High-Density Deepwater Benthic Communities	31
C.2.3 Designated Topographic Features	32
C.2.4 Pinnacle Trend Area Live Bottoms.....	33
C.2.5 Eastern Gulf Live Bottoms.....	33
C.3 Threatened, Endangered, and Protected Species and Critical Habitat	33
C.3.1 Sperm Whale (Endangered).....	37
C.3.2 Rice’s Whale (Endangered)	41
C.3.3 West Indian Manatee (Threatened)	46
C.3.4 Non-Endangered Marine Mammals (Protected)	48
C.3.5 Sea Turtles (Endangered/Threatened)	53
C.3.6 Piping Plover (Threatened)	59
C.3.7 Whooping Crane (Endangered)	60
C.3.8 Black-capped Petrel	62
C.3.9 Rufa Red Knot (Threatened)	64
C.3.10 Oceanic Whitetip Shark (Threatened)	66
C.3.11 Giant Manta Ray (Threatened)	67
C.3.12 Gulf Sturgeon (Threatened).....	68
C.3.13 Nassau Grouper (Threatened)	70

Contents (Continued)

	Page
C.3.14 Smalltooth Sawfish (Endangered).....	70
C.3.15 Beach Mice (Endangered).....	71
C.3.16 Florida Salt Marsh Vole (Endangered)	72
C.3.17 Panama City Crayfish (Threatened)	73
C.3.18 Threatened Coral Species	73
C.3.19 Queen Conch (Threatened)	75
C.4 Coastal and Marine Birds.....	75
C.4.1 Marine Birds.....	75
C.4.2 Coastal Birds	78
C.5 Fisheries Resources	80
C.5.1 Pelagic Communities and Ichthyoplankton	80
C.5.2 Essential Fish Habitat	83
C.6 Archaeological Resources.....	87
C.6.1 Shipwreck Sites	87
C.6.2 Prehistoric Archaeological Sites.....	88
C.7 Coastal Habitats and Protected Areas	89
C.8 Socioeconomic and Other Resources	91
C.8.1 Recreational and Commercial Fishing	91
C.8.2 Public Health and Safety	93
C.8.3 Employment and Infrastructure	94
C.8.4 Recreation and Tourism.....	94
C.8.5 Land Use.....	95
C.8.6 Other Marine Uses.....	95
C.9 Cumulative Impacts	96
D. Environmental Hazards.....	97
D.1 Geologic Hazards	97
D.2 Severe Weather	97
D.3 Currents and Waves	97
E. Alternatives	98
F. Mitigation Measures	98
G. Consultation.....	99
H. Preparers.....	99
I. References	100

List of Tables

Table	Page
1 Notices to Lessees and Operators (NTLs) applicable to the Environmental Impact Analysis (EIA).....	4
2 Matrix of impact-producing factors (IPFs) and affected environmental resources	9
3 Support vessel and aircraft fuel capacity and trip frequency or duration in Mississippi Canyon Blocks 778 during the proposed project	14
4 Conditional probabilities of a spill in Mississippi Canyon Block 778 contacting shoreline segments based on the 30-day Oil Spill Risk Analysis (OSRA) (From: Ji et al., 2004)	19
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 (OSRA)	19
6 Baseline benthic community data from stations 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)	29
7 Federally listed Endangered and Threatened species potentially occurring in the project area and along the northern Gulf Coast.....	34
8 Migratory fish species with designated Essential Fish Habitat (EFH) at or near Mississippi Canyon Block 778, including life stage(s) potentially present within the project area (National Marine Fisheries Service [NMFS], 2017)	84
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 OSRA model	90

List of Figures

Figure	Page
1	Location of Mississippi Canyon Block 778 3
2	Bathymetric map of the project area showing the location of the site within Block 778 in Mississippi Canyon 23
3	Location of loggerhead sea turtle designated critical habitat in relation to the project area..... 55
4	Location of selected environmental features in relation to the project area 61

Acronyms and Abbreviations

ac	acre	MEG	monoethylene glycol
bbl	barrel	MMC	Marine Mammal Commission
BOEM	Bureau of Ocean Energy Management	MMPA	Marine Mammal Protection Act
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement	MMS	Minerals Management Service
BOP	blowout preventer	NAAQS	National Ambient Air Quality Standards
BOPD	barrels of oil per day	NMFS	National Marine Fisheries Service
bp	BP Exploration & Production Inc.	NOAA	National Oceanic and Atmospheric Administration
BSEE	Bureau of Safety and Environmental Enforcement	NPDES	National Pollutant Discharge Elimination System
CFR	Code of Federal Regulations	NTL	Notice to Lessees and Operators
COLREGS	International Regulations for Preventing Collisions at Sea	NWR	National Wildlife Refuge
dB re 1 µPa	decibel relative to one micropascal	OCS	Outer Continental Shelf
DP	dynamically positioned	OSFR	Oil Spill Financial Responsibility
DPS	distinct population segment	OSRA	Oil Spill Risk Analysis
DOCD	Development Operations and Coordination Document	PAH	polycyclic aromatic hydrocarbons
EEZ	Exclusive Economic Zone	PBR	Potential Biological Removal
EFH	Essential Fish Habitat	PM	particulate matter
EIA	Environmental Impact Analysis	PSD	Prevention of Significant Deterioration
EIS	Environmental Impact Statement	ROSRP	Regional Oil Spill Response Plan
ESA	Endangered Species Act	RRT	Regional Response Team
FAD	fish aggregating device	RWA	Rice's Whale Area
FOSC	Federal On-Scene Coordinator	SEL _{24h}	sound exposure level over 24-hours
FR	Federal Register	SEMS	Safety and Environmental Management system
ft	feet	SPL	sound pressure level
GPS	global positioning system	SWSS	Sperm Whale Seismic Study
GC	Gulf Council	TTS	temporary threshold shifts
ha	hectare	USCG	U.S. Coast Guard
HAPC	Habitat Area of Particular Concern	USEPA	U.S. Environmental Protection Agency
Hz	hertz	USFWS	U.S. Fish and Wildlife Service
IPF	impact-producing factor	VOC	volatile organic compound
IMT	Incident Management Team	WCD	worst case discharge
kHz	kilohertz		
km	kilometer		
m	meter		
MARPOL	International Convention for the Prevention of Pollution from Ships		
MC	Mississippi Canyon		

Introduction

BP Exploration & Production Inc. (bp) is submitting a Supplemental Development Operations and Coordination Document (DOCD) for Mississippi Canyon (MC) Block 778 (MC 778) in the Gulf of America. Under this DOCD, bp proposes to install a new subsea boosting station (rated for 12.5 k pressure and equipped with two retrievable 4-MW pump modules) to increase production from the Thunder Horse South wells. These boosted wells will be routed through the P2 riser, while any wells still flowing naturally will continue to use the P1 riser. The subsea pumps are designed to create about 1,800 to 2,000 psi of pressure increase in the P2 flowline to help move the fluids to the host facility. To support the new system, the project includes installing two new dynamic umbilicals, removing an existing subsea jumper, and installing two new flowline jumpers. It also includes all required subsea hookups and control connections, along with new topsides equipment needed to operate the pumps and address flow-assurance needs. Because the project takes place in an existing field, some existing equipment must be removed, and the new boosting station must be tied into the current topsides electrical, hydraulic, and chemical-injection systems. All surface locations will be in MC 778. This report provides the Environmental Impact Analysis (EIA) for the activities proposed by bp.

MC 778 is located within the Central Gulf of America Outer Continental Shelf (OCS) Planning Area, approximately 64 statute miles (103 kilometers [km]) from the nearest shoreline (Plaquemines Parish, Louisiana), 120 statute miles (193 km) from the regional onshore base (Port Fourchon, Louisiana), and 163 statute miles (262 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed site is approximately 6,037 ft (1,840 m) (bp, 2001). The topside construction is expected to run from the last quarter of 2026 through 2027, followed by subsea installation during the first half of 2028, ending with the pump start-up in mid-2028. Dynamically positioned (DP) installation vessels will be on site for 45 days for subsea equipment installation.

The EIA for this DOCD 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) 550.242(s) and 550.261. 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 BOEM, Regulation and Enforcement (BOEMRE), including NTLs 2008-G04 (extended by 2015-N02) and 2015-N01. Potential impacts have been analyzed at a broader level in the 2014-2029 Programmatic Environmental Impact Statement (EIS) for the OCS Oil and Gas Leasing Program (BOEM, 2023a) and in multisale EISs for the Western and Central Gulf of Mexico Planning Areas (BOEM, 2012a; b; 2013; 2014; 2015; 2016b; 2017, 2023b). The most recent multisale EIS contains updated environmental baseline information in light of the Macondo (*Deepwater Horizon*) incident and addresses potential impacts of a catastrophic spill (BOEM, 2012a; b; 2013; 2014; 2015; 2016b; 2017). The National Marine Fisheries Service (NMFS) Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of America assesses impacts and requires additional mitigation measures for protected species (NMFS, 2025a). The analyses from those documents are incorporated here by reference.

All proposed activities in this DOCD are governed by the bp Regional Oil Spill Response Plan (ROSRP), as filed by BP America Inc. (Operator No. 21372) under cover letter dated 7 October 2024, on behalf of several affiliated companies, including BP Exploration & Production Inc. (Operator No. 02481). The ROSRP was confirmed in compliance and approved by the Bureau of Safety and Environmental Enforcement (BSEE) on 10 January 2025.

The bp ROSRP should meet the requirements contained in 30 CFR part 254, and, as operator, bp (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this DOCD, according to 30 CFR part 553 and NTL No. 2008-N05, “Guidelines for Oil Spill Financial Responsibility for Covered Facilities.” The bp ROSRP details the plan for response to manage oil spills that may result from drilling and production operations at the wells with a response program based on regional capabilities to address spills ranging from small operations-related spills to a worst-case discharge (WCD) from a well blowout. The program, as detailed in bp’s ROSRP, is intended to meet requirements of the relevant coastal states and applicable federal oil spill planning regulations. It also includes information regarding bp’s incident management team (IMT) and dedicated response assets, potential spill risks, and local environmentally sensitive areas. The ROSRP describes personnel and equipment mobilization, the IMT 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.

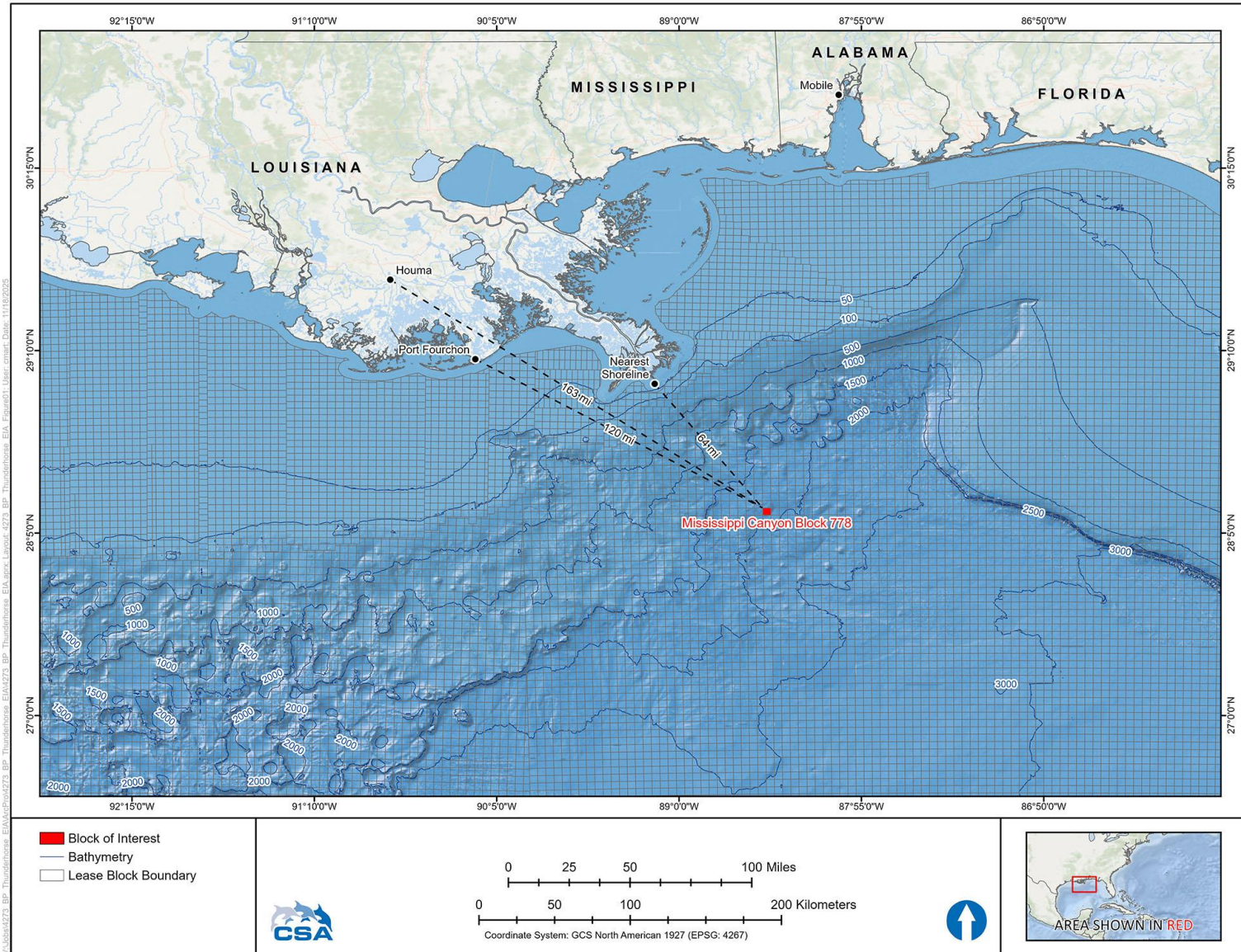


Figure 1. Location of Mississippi Canyon Block 778.

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

NTL	Title	Summary
BOEM-2020-G01	Air Quality Information Requirements for Exploration Plans, Development Operations Coordination Documents, and Development and Production Plans in the Gulf of Mexico Region	Cancels and supersedes the air emission information portion of NTL 2008-G04, Information Requirement for Exploration Plans and Development Operations Coordination Documents, effective date 5 May 2008.
BOEM-2016-G01 supplemented by Attachment 3 (NMFS, 2025a)	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. This NTL may be reissued to address instances where guidance in the 2025 NMFS Biological Opinion (NMFS, 2025a) differs from the guidance provided in this NTL.
BOEM-2016-G02 supplemented by Attachment 1 (NMFS, 2025a)	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 BOEM, BSEE, and operators in order to comply with the Endangered Species Act and the Marine Mammals Protection Act. This NTL may be reissued to address instances where guidance in the 2025 NMFS Biological Opinion (NMFS, 2025a) differs from the guidance provided in this NTL.
BSEE-2015-G03 supplemented by Attachment 2 (NMFS 2025a)	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.
BOEM 2015-N01	Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS for Worst Case Discharge and Blowout Scenarios	Provides guidance regarding information required in WCD descriptions and blowout scenarios.

Table 1. (Continued).

NTL	Title	Summary
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 America.
BSEE 2014-N01	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 BSEE website.
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 Outer Continental Shelf (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 blowout preventers (BOPs) or surface BOPs 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 <i>Federal Register</i> [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 America.

Table 1. (Continued).

NTL	Title	Summary
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.
2008-N05	Guidelines for Oil Spill Financial Responsibility (OSFR) for Covered Facilities	Provides clarification and guidance to operators/lessees on policies for submitting required OSFR documents to the Gulf of America OCS Region as required under 30 CFR part 253.
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.

BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; NMFS = National Marine Fisheries Service; OCS = Outer Continental Shelf.

A. Impact-Producing Factors

Based on the description of bp's proposed activities, a series of impact-producing factors (IPFs) have been identified. **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 environmental resources that may be impacted as a result of one or more IPFs. The tabular matrix indicates which of the routine activities and accidental events could affect specific resources. 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.

- Installation vessel 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.

A.1 Installation Vessel Presence, Marine Sound, and Lights

The proposed subsea equipment will be installed using a DP installation vessel. 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 installation vessel is precisely monitored while thrusters positioned at various locations 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 installation vessel during this project. The selected installation vessel is expected to be on site for up to an estimated 45 days, inclusive of mobilization and demobilization time. The installation vessel 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 installation vessel include the physical presence in the ocean, entanglement and entrapment from moon pools and equipment in the water, working and safety lighting, and underwater sound produced during operations.

During the proposed activities, there may be occasions where equipment may be suspended in the water column. Entanglement and entrapment of protected species can occur from equipment or mooring lines with slack or looping lines and cables in the water. Marine mammals and sea turtles can become entangled in vessel lines in the water with loops or sufficient looping to trap the animals if they come into contact with them. Entanglement and entrapment can be minimized with proper maintenance of equipment or mooring lines in the water by encasing flexible lines, removing excess lines, and keeping lines taught to remove slack and line loops.

The physical presence of the installation vessel in the ocean can attract and potentially impact pelagic marine resources, as discussed in **Section C.5.1**. DP vessels 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.

The installation operations of the subsea equipment can be expected to produce sound associated with machinery on deck such as generators, pumps, and compressors onboard the installation vessel which transmits sound through the hull to the water; propulsion machinery that transmits directly to the water during station keeping; and machinery operations from subsea equipment located within the water column. Machinery operations from both the installation vessel and subsea equipment would produce low-frequency (<1 kHz) sound with an estimated source level of 154 decibels (dB) referenced to (re) 1 micropascal (μPa) at 1 meter (m) which would not be expected to exceed ambient levels beyond approximately 0.62 mi (1 km) (Greene Jr., 1986; Center for Marine Acoustics, 2023). 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 dB re 1 μPa m, with a primary amplitude frequency below 600 Hz (Blackwell and Greene Jr., 2003, McKenna et al., 2012; Kyhn et al., 2014). BOEM (2012a) stated that source levels from oil and gas production platforms are low, with a frequency range of 50 to 500 Hz.

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

Environmental Resources	Impact-Producing Factors									
	Installation Vessel Presence (incl. sound & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marine Debris	Support Vessel/ Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
Physical/Chemical Environment										
Air quality	--	--	X	--	--	--	--	--	X(6)	X(6)
Water quality	--	--	--	X	--	--	--	--	X(6)	X(6)
Seafloor Habitats and Biota										
Soft bottom benthic communities	--	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)
Rice’s 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)
Black-capped Petrel (Endangered)	X	--	--	--	--	--	--	X(8)	X(6,8)	X(6,8)
Rufa Red Knot (Threatened)	--	--	--	--	--	--	--	X(8)	X(6,8)	X(6,8)
Oceanic whitetip shark (Threatened)	X	--	--	--	--	--	--	--	--	X(6)
Giant manta ray (Threatened)	X	--	--	--	--	--	--	--	--	X (6)
Gulf sturgeon (Threatened)	--	--	--	--	--	--	--	X(8)	--	X(6)
Nassau grouper (Threatened)	--	--	--	--	--	--	--	--	--	X(6)
Smalltooth sawfish (Endangered)	--	--	--	--	--	--	--	--	--	X(6)
Beach mice (Endangered)	--	--	--	--	--	--	--	--	--	X(6)
Florida salt marsh vole (Endangered)	--	--	--	--	--	--	--	--	--	X(6)
Panama City crayfish (Threatened)	--	--	--	--	--	--	--	--	--	X(6)

Table 2. (Continued).

Environmental Resources	Impact-Producing Factors									
	Installation Vessel Presence (incl. sound & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marine Debris	Support Vessel/ Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
Threatened coral	--	--	--	--	--	--	--	--	--	X(6)
Queen conch	--	--	--	--	--	--	--	--	--	X(6)
Coastal and Marine Birds										
Marine birds	X	--	--	--	--	--	--	X	X(6)	X(6)
Coastal 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										
Coastal habitats and protected areas	--	--	--	--	--	--	--	X	--	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)

(1-8) See table footnotes on the following page.

X = potential impact; dash (--) = no impact or negligible impact.

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 lease 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 on high-density deepwater benthic communities are anticipated. There are no features indicative of seafloor hard bottom that could support high-density chemosynthetic communities or coral communities within 457 m (1,500 ft) of the proposed boosting station locations (bp, 2001).
- (5) *Exploration or production activities where Hydrogen Sulfide (H₂S) concentrations greater than 500 ppm might be encountered.*
 - The lease block is classified as H₂S absent.
- (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 to archaeological resources are expected; the project area is well beyond the 130-m depth contour used by BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of America (BOEM, 2025a). The site clearance letter (bp, 2001), reported that no archaeologically significant sonar contacts were identified within 457 m (1,500 ft) of the proposed boosting station.
- (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 installation vessel 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.2 Physical Disturbance to the Seafloor

BOEM (2012a) estimated an area of seafloor disturbance between 1.2 acres (ac) (0.5 hectares [ha]) and 2.5 ac (1.0 ha) per kilometer of pipeline and/or flowline installation. Due to the water depth in the project area, it is anticipated that the umbilicals will not be buried by trenching but will instead be placed on the seafloor, decreasing the area of impact.

A.3 Air Pollutant Emissions

The air pollutant emissions are calculated in accordance with BOEM requirements for screening air impacts and summarized in the Air Quality Emissions Report in DOCD Section 8. The primary air pollutants typically associated with OCS activities are suspended particulate matter (PM), sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and carbon monoxide (CO) (Reşitoğlu et al., 2015). These emissions occur mainly from combustion of fuels by diesel and natural gas-powered generators, pumps and motors.

The Air Quality Emissions Report demonstrates 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.

A.4 Effluent Discharges

Effluent discharges are summarized in DOCD Section 7. 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.

Effluent discharges are expected to include treated sanitary and domestic wastes and deck drainage. Miscellaneous discharges of seawater and freshwater to which treatment chemicals have been added, such as desalination unit brine, chemically treated freshwater and seawater, uncontaminated ballast and bilge water, fire water, cooling water, excess cement slurry, and blowout prevention fluids also are possible to be discharged in accordance with the conditions in the NPDES permit.

Under certain circumstances, the installation vessel 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 construction 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 DOCD.

A.5 Water Intake

Seawater may be drawn from the ocean for once-through, non-contact cooling of machinery on the installation vessel. 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 vessel ultimately selected for this project will be in compliance with all applicable cooling water intake structure design requirements, monitoring, and limitations. Where applicable, the vessel 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 DOCD Section 7.1. Waste generated during the proposed project is expected to be properly stored and segregated on the installation and support vessels. Wastes are expected to be packaged in appropriate non-hazardous or hazardous waste containers for transportation 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 bp waste management practices and procedures is expected to result in either no impacts or negligible impacts.

A.7 Marine Debris

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 will be followed by bp and its contractors. 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 materials. 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

Existing shorebase facilities at Port Fourchon, Louisiana, will be used for bp 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.

The project will be supported by onshore crew boats and supply vessels making generally two to four round trips per week. 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 work site 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) overpopulated 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 100 m (328 ft) of marine mammals (BOEM, 2012a; NMFS, 2020).

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 Blocks 778 during the proposed 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 sound through both air and water. The support vessels will use conventional diesel-powered screw propulsion. Vessel sound is a combination of narrow band (tonal) and broadband sound (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012). Tones typically dominate up to approximately 50 Hz, whereas broadband sounds may extend to 100 kHz. The primary sources of vessel sound 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 μ Pa m (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012).

Penetration of aircraft sound 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 μ 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 midwater 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 focus on the following two potential types:

- a small fuel spill, which is the most likely type of spill during proposed activities of this DOCD; and
- a large oil spill, up to and including the WCD for this DOCD, 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; 2023a,b; 2025) analyzed three types of accidents relevant to oil and gas operations that could lead to potential impacts to the marine environment: loss of well control, vessel collision, and chemical spills. These types of accidents, along with dropped objects, and an H₂S 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, other fluids, sand, and/or water. Loss of well control includes incidents from the very minor up 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). Loss of well control may result in the release of fluids/oil. Not all loss of well control events result in blowouts (BOEM, 2012a). In addition to the potential release of gas, condensate, oil, sand, and/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.

The robust system bp has in place to prevent loss of well control includes measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early blowout intervention as described in the NTL 2015-N01 package submitted with this DOCD, 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 NTL 2010-N10, which specifies additional safety measures for OCS activities.

Vessel Collisions. BSEE data show that there were 205 OCS-related collisions between 2007 and 2023 (BSEE, 2024). 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 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. All applicable USCG and BOEM safety requirements will be followed by bp and its contractors to minimize the potential for vessel collisions.

Dropped Objects. Objects dropped overboard the installation vessel could potentially pose a risk to existing live subsea pipelines or other infrastructure. If a dropped pipe or other subsea equipment landed on existing seafloor infrastructure, loss of integrity of seafloor pipelines, umbilicals, etc. could result in a spill. Dropped objects could also result in seafloor disturbance and potential impacts to benthic communities. All BOEM and BSEE safety requirements aimed at minimizing the potential for dropped objects will be met by bp and its contractors.

Chemical Spills. The proposed installation of a subsea pump is expected to use hydraulic fluids, control and preservation fluids, along with seawater. Chemicals are stored and used for pipeline hydrostatic testing, leak and pressure testing of subsea equipment, and other well operations. The relative quantities of their use is reflected in the largest volumes spilled (BOEM, 2017b). Completion, workover, and treatment fluids are the largest quantity used and comprise the largest releases. Any potential leak due to pressure testing failure will be limited to a single line leak and would be limited to less than 1 bbl. Potentially spilled fluids include Transaqua HT, monoethylene glycol (MEG) 50/50, or methanol. 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).

H₂S Release. MC 778 is classified as H₂S absent.

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 America 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 used. 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 (3 bbl of fuel) (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 these oils are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. 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 America. Diesel fuel is readily and completely degraded by naturally occurring microbes (National Oceanic and Atmospheric Administration [NOAA], 2023).

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 rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a).

For purposes of the EIA, the fate of a small diesel fuel spill of 3 bbl was estimated using WebGNOME, a publicly available oil spill trajectory and fate model developed by NOAA (NOAA, 2022a). 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 (NOAA, 2022a). 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 WebGNOME 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 from shore of these potential spills on the OCS and their lack of persistence, it is unlikely that a small 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. DOCD Appendix G provides a discussion of bp and its contractors' response efforts if a spill were to occur during bp's operational activities associated with the proposed DOCD.

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 alter its potential 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 PM, and stranding on shore or sedimentation to the seafloor (National Research Council, 2003a, International Tanker Owners Pollution Federation Limited, 2018).

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 DOCD are governed by bp's ROSRP, which meets the requirements contained in 30 CFR 254.

A.9.2 Large Oil Spill (Worst Case Discharge)

Under this DOCD, bp proposes to install a new subsea boosting station to increase production from the Thunder Horse South wells in MC 778. Additional subsea equipment removal and hookups will be required to support the new system. The uncontrolled blowout scenario is for a potential blowout of the well which bp calculates has the highest liquid hydrocarbons rate potential in the area.

Spill Size. Per bp, the day 1 WCD is estimated to be 18,100 barrels of oil per day (BOPD). If there was a large enough leak on the P2 flowline (or any flowline), that would activate the leak detection monitoring, which would start a 4-hour timer. At the end of the 4 hours, all wells allocated to that flowline would automatically shut in.

Spill Probability. Statistics from offshore oil and gas market in the U.S. Gulf of America provide a reasonable basis for evaluating oil spill risk. Historically, during exploratory drilling, blowouts are rare events and most do not result in oil spills. A 2010 analysis using the SINTEF¹ database estimates a 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). According to ABS Consulting Inc. (2016), the spill rate for spills >1,000 bbl dropped to 0.22 spills per billion barrels produced. According to the ABS Consulting, Inc. (2016 analysis, the baseline risk of loss of well control spill >10,000 bbl on the OCS is estimated to be once every 27.5 years.

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 America.

The results for Launch Area 59 (where MC 778 is located) are presented in **Table 4**. The model predicts shoreline contact in two Louisiana parishes (Lafourche and Plaquemines) within 10 days of a spill (1% to 5% conditional probability, respectively). Within 30 days of a spill, the model estimates potential shoreline contact in seven Louisiana parishes and two Florida counties. Conditional probabilities range from 1% to 11%, with Plaquemines Parish, Louisiana, having the highest probability of shoreline contact.

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

Table 4. Conditional probabilities of a spill in Mississippi Canyon Block 778 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 778 (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

¹Conditional probability refers to the probability of contact within the stated time period, assuming that a spill has occurred ("--" indicates <0.5%). Values are conditional probabilities that a hypothetical spill in the project area (represented by OSRA Launch Area 59) could contact shoreline segments within 3, 10, or 30 days.

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, 2017b). The spatial resolution is limited, with five launch points in the entire Western and Central Planning Areas of the Gulf of America. 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 (OSRA). Values are conditional probabilities that a hypothetical spill in the project area could contact shoreline segments within 60 days. (BOEM (2017b)).

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 (%)															
Aransas, Texas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Matagorda, Texas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Vermilion, Louisiana	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Terrebonne, Louisiana	--	--	--	--	--	--	--	--	1	--	--	--	--	--	2	2

Table 5. (Continued).

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 (%)															
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	6	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	--	--	--	--	--	--	--	--	--	--	--	--
Charlotte, Florida	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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

¹Conditional probability refers to the probability of contact within the stated time period assuming that a spill has occurred ("--" indicates <0.5%). Values are conditional probabilities that a hypothetical spill in the project area could contact shoreline segments within 60 days.

From Launch Point 2, potential shoreline contacts within 60 days, range from the nearest shoreline in Plaquemines, Louisiana to the Florida Panhandle. Based on statewide contact probabilities within 60 days, Louisiana, Mississippi, and Alabama have the highest likelihood of contact during all four seasons, with Alabama having higher probabilities in spring (37%) and Louisiana having higher probabilities during summer, fall, and winter (ranging from 33% to 36% within 60 days). The model predicts a 26% probability of a spill contacting Florida shorelines during the spring, the highest of all seasons. No Texas shorelines have a conditional probability of contact greater than 2% for any seasons. Based on the 60-day trajectories, Mobile, Alabama is the only county or parish with 10% or greater contact probability during any season, with Jackson, Mississippi following close behind with 8% or greater (**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.

Weathering. The constituents of diesel fuel are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. NOAA has reported that diesel fuel is readily and completely degraded by naturally occurring microbes (NOAA, 2023).

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 wt. % 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.

Spill Response. All proposed activities and facilities in this DOCD will be covered by the Gulf of Mexico ROSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated 9 December 2024 on behalf of several companies listed in the plan including bp Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on 10 January 2025.

The ROSRP 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 ROSRP 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
- For operations using a subsea blowout preventer (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.

As 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 America. Primary response equipment for the activation of bp's ROSRP is located in Houma, Louisiana; Lake Charles, Louisiana; Galveston, Texas; Pensacola, Florida; Mobile, Alabama; Pascagoula, Mississippi; Ft. Jackson, Louisiana; Venice, Louisiana; and Corpus Christi, Texas. The preplanned staging area for this DOCD is Port Fourchon, Louisiana.

See DOCD Appendix G for a detailed description of bp's ROSRP and site-specific response for an oil spill associated with this project.

B. Affected Environment

The project area is in the central Gulf of America, 64 statute miles (103 km) from the nearest shoreline (Plaquemines Parish, Louisiana), 120 statute miles (193 km) from the onshore base at Port Fourchon, Louisiana, and 163 statute miles (262 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The Water depth at the location of the proposed sites is approximately 6,037 ft (1,840 m) (bp, 2001) (**Figure 2**).

The seafloor in the vicinity of the proposed boosting station near the existing wellsite is generally smooth and featureless, with a seafloor gradient ranging from 0.5 to 1.7°. Based on an assessment of autonomous underwater vehicle survey datasets, no geophysical evidence, hard bottoms or active hydrocarbon seeps were identified that could indicate the presence of high-density chemosynthetic communities within 457 m (1,500 ft) of the proposed boosting station (bp, 2001).

A detailed description of the regionally 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 the lease sale EISs (BOEM, 2012a; 2013; 2014; 2015; 2016b; 2017a). 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**.

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 America Planning Areas (BOEM, 2013; 2014; 2015; 2016a; b; 2017a). The information in these documents is incorporated by reference. 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-based pollution sources and the lack of sources offshore. Therefore, air quality at the proposed boosting station 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 America is relatively good (BOEM, 2012a). As of March 2025, Mississippi, Alabama, and Florida Panhandle coastal counties are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2025). St. Bernard Parish in Louisiana is a nonattainment area for sulfur dioxide based on the 2010 standard (USEPA, 2025). One coastal metropolitan area in Texas (Houston-Galveston-Brazoria) is a nonattainment area for 8-hour ozone (2015 Standard). One coastal metropolitan area in Florida (Tampa) was reclassified in 2018 from a nonattainment area to maintenance status for lead based on the 2008 Standard (USEPA, 2019).

As noted earlier, based on calculations made pursuant to applicable regulations, emissions from proposed actions 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 offshore 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 particulate matter (PM), SO_x, NO_x, VOCs, and CO. As noted by BOEM (2017a), 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 DOCD 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 America 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 (CO₂) and methane (CH₄) 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 CO₂ 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), emissions of air pollutants from routine activities in the Central Gulf of America 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 expected 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 (PSD) 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 95 statute miles² (153 km) from the Breton Wilderness Area.

There are three Class I air quality areas on the west coast of Florida: St. Marks NWR in Wakulla County, Florida; Chassahowitzka NWR in Hernando County, Florida; and Everglades National Park in Monroe, Miami-Dade, and Collier counties, Florida. The project area is approximately 270 mi (434 km) from the closest Florida Class I air quality area (St. Marks NWR Class I Air Quality Area). No further analysis or control measures are required. Compliance with all BOEM requirements for air emissions will be maintained by bp and its contractors.

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; 2023a,b; 2025). 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 ROSRP is expected to reduce the potential impacts. DOCD 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.

² Distance calculated based on the nearest point of block MC 778 to the Breton Wilderness Area.

A small fuel spill would affect air quality near the spill site by introducing VOCs into the atmosphere through evaporation. The WebGNOME model (see **Section A.9.1**) indicates that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2022a). 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 should not affect coastal air quality because the spill would not be expected to make landfall or reach coastal waters prior to dissipating (see **Section A.9.1**).

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; 2023a,b; 2025).

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 VOCs released. 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. This approval would also be based upon consultation with the regional response team (RRT), including 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. Deepwater areas in the northern Gulf of America are relatively homogeneous with respect to temperature, salinity, and oxygen (BOEM, 2017a, 2025). 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 America, there are localized areas (termed natural seeps) that release natural seepage of oil, gas, and brines from subsurface deposits into near surface sediments and up through the water column. No natural seeps were noted within 457 m (1,500 ft) of the proposed activities (bp, 2001).

The only 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

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, due to elevated levels of nutrients, organic matter, and chlorine. However, they should dilute rapidly to undetectable levels within tens to hundreds of meters from the source. Deck drainage includes rain, deck washings, and runoff from curbs, gutters, and drains (including drip pans) in work areas.

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 to 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.

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.

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; 2023; 2025). 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 ROSRP is expected to potentially help mitigate and reduce the impacts. DOCD 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, 2023). It is possible for the diesel oil that is dispersed by wave action to form droplets that are small enough to 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 America.

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 of the release 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 (NOAA, 2022) (see **Section A.9.1**). 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, 2023). 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; 2023; 2025).

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; b; c). Dispersants would be applied only after approval from the Federal On-Scene Coordinator (FOSC) with collaboration from the USEPA and RRT 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 VOCs released. 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 oil released subsea in the deepwater environment after the 2010 *Deepwater Horizon* incident. Initial studies 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 depletion (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; Valentine et al., 2014). Additional studies investigated the effects of dissolved hydrocarbon gases (e.g., methane, propane, ethane) and the microbial response to a deepwater oil spill. Results suggest dissolved hydrocarbon gases may promote rapid hydrocarbon respiration in deep waters by low-diversity 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 2017 study 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 (Liu et al., 2017).

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 before low molecular weight alkanes and volatiles are weathered (Operational Science Advisory Team, 2011) 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, are the coastal areas with the most potential for water quality to be affected (5% probability within 10 days; and 11% probability within 30 days). Lafourche Parish, Louisiana may be affected within 10 days (1% probability), and other Louisiana and Florida shorelines could also be affected within 30 days. The 60-day OSRA model predicts contact of shorelines between Plaquemines Parish, Louisiana, and Gulf County Florida, with a maximum conditional probability of contact of 24% in (**Table 5**) (BOEM, 2017b).

C.2 Seafloor Habitats and Biota

The water depth at the location of the proposed site is approximately 6,037 ft (1,840 m) (bp, 2001). According to BOEM (2016a), existing information for the deepwater Gulf of America 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 457 m (1,500 ft) of the proposed activities (bp, 2001). 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; Bassett et al., 2023) can be used to describe typical baseline benthic communities at similar water depths within the region. **Table 6** summarizes density data collected at four stations in water depths similar to those in the proposed project area.

Table 6. Baseline benthic community data from stations 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 (m)	Abundance		
		Meiofauna (individuals m ⁻²)	Macrofauna (individuals m ⁻²)	Mega fauna (individuals ha ⁻¹)
NB3	1,874	165,245	1,342	191
S36	1,839	799,963	4,481	359
GKF	1,897	84,348	737	0

Meiofaunal and megafaunal abundances from Rowe and Kennicutt (2009); macrofaunal abundance from Wei (2006). -- = no data available. m = meter, ha = hectare.

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 165,000 to 800,000 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 macrofauna 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 America continental slope (Wei, 2006). Densities decrease exponentially with water depth. Based on an

equation presented by Wei (2006), macroinfaunal densities in the water depths of the project area are expected to range from approximately 737 to 4,481 individuals m⁻².

Polychaetes are typically the most abundant macroinfaunal group on the northern Gulf of America 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 America when compared to the eastern and western regions. Wei (2006) recognized four depth-dependent faunal zones (1 through 4), two of which are divided horizontally. The project area is near the border of Zone 2E. Zone 2E, which extends from the Texas-Louisiana slope to the mid-west Florida terrace, had the highest estimated species richness. The most abundant species in this zone were the polychaetes *Aricidea suecica*, *Levinsenia uncinata*, considered indicator species for the faunal zone. Additionally, polychaetes *Litocorsa antennata*, *Paralacydonia paradoxa*, and *Tharyx marioni*; and the bivalve *Heterodonta* spp. Contributed to the most abundance species in Zone 2E (Wei, 2006).

The megafaunal density at three stations with similar water depths as the project area ranged between 0 and 359 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 also 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).

Of the IPFs that potentially may affect benthic communities, physical disturbance to the seafloor is applicable to all seafloor resources (**Table 2**) potential effects from a large oil spill resulting from a well blowout at the seafloor could impact soft bottom benthic communities 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 proposed in the project area for the installation of boosting station and associated infrastructure changes, DP installation vessels will disturb the seafloor in the immediate vicinity (near the existing well). The subsea equipment will be placed on the seafloor Depending upon the specific configuration, this area is generally about 0.25 ha (0.62 ac) per well (BOEM, 2012a). Additional areas of seafloor, which decreases the area of impact compared to trenching for burial purposes. A shallow geohazards assessment of the proposed location indicated that there are no potential hardgrounds within 457 m (1,500 ft) (bp, 2001).

The areal extent of these seafloor impacts are expected to be small compared to the lease area itself, and these types of soft bottom communities are ubiquitous along the northern Gulf of America 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 a Large Oil Spill

The most likely effects of a subsea blowout on benthic communities would be within a few hundred meters of the project location. 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).

C.2.2 High-Density Deepwater Benthic Communities

As defined by NTL 2009-G40, high-density deepwater benthic communities are sensitive deep-sea habitats composed of dense concentrations of long-lived, structure-forming corals, sponges, and related organisms found on hard-bottom features below 300 m. Chemosynthetic communities were discovered in the central Gulf of America in 1984 and have been studied extensively (MacDonald, 2002). Deepwater coral communities are also known from numerous locations in the Gulf of America (Brooke and Schroeder, 2007; CSA International, 2007; Brooks et al., 2012; Bassett et al., 2023). In the Gulf of America, deepwater coral communities occur almost exclusively on exposed authigenic carbonate rock created by a biogeochemical (microbial) process.

The proposed activities are expected to only disturb the seafloor only around the well where the boosting station will be installed. Additional areas of seafloor will likely be disturbed during changes to umbilical configuration, but this impact will be limited to the immediate area of umbilical placement or removal, or other associated proposed infrastructure.

The site clearance letter identified benthic features that could support high-density deepwater benthic communities 20 mi (32 km) as the closest sensitive benthic feature near the proposed activities, known as MC 640, located in 1,404 m (4,606 ft) of water. This far exceeds the survey clearance radius of 457 m (1,500 ft) (bp, 2001).

The only IPF identified for this project that could affect high-density deepwater benthic communities is a large oil spill from a well blowout on the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel would float and dissipate on the sea surface. Likewise, a large oil spill from a well blowout at the surface would not likely affect benthic communities. 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 activities.

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 only within approximately 300 m (984 ft) of the blowout (BOEM, 2012a; 2013). However, based on the site clearance letter for the proposed site (bp, 2001), there are no seafloor features that could support high-density deepwater benthic communities within 457 m (1,500 ft) of the proposed site. 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 of the release (BOEM, 2017a). During the *Deepwater Horizon* 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 FOSC and USEPA prior to the use of dispersants.

The biological effects and fate of the oil remaining in the Gulf of America from the *Deepwater Horizon* incident are still being studied, but numerous papers have been published discussing the nature of subsea oil plumes (e.g. Ramseur, 2010; Reddy et al., 2012; Valentine et al., 2014; Bassett et al., 2023). Hazen et al. (2010) reported changes in plume hydrocarbon composition with distance from the source. Their findings suggested the potential exists for intrinsic bioremediation of the oil plume in the deepwater column without substantial oxygen drawdown. Noirungsee et al. (2020) observed that pressure has a significant influence on deep-sea sediment microbial communities with the addition of dispersant and oil with dispersants being shown to have an inhibitory effect on hydrocarbon degraders. Thus, the dispersant persistence due to hydrostatic pressure could further limit microbial oil biodegradation (Noirungsee et al., 2020).

Potential impacts of oil on high-density deepwater benthic communities are discussed in recent EISs (BOEM, 2012a; 2015; 2016b; 2017a; 2023ab; 2025). 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).

C.2.3 Designated Topographic Features

The project area 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 66 statute miles (106 km) from 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 edge.

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 68 statute miles (109 km) from 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 edge.

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 America 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 America Planning Area. The nearest block covered by the Live Bottom Stipulation, as defined by NTL 2009-G39, is located approximately 89 statute miles (143 km) from 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 America). 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. NMFS has jurisdiction for ESA-listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of America. The USFWS has jurisdiction for ESA-listed birds, the West Indian manatee, and sea turtles while on their nesting beaches.

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 America
			Project Area	Coastal	
Marine Mammals					
Rice's whale	<i>Balaenoptera riceii</i>	E	X	--	None
Sperm whale	<i>Physeter macrocephalus</i>	E	X	--	None
West Indian manatee	<i>Trichechus manatus</i> ^a	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	<i>Caretta caretta</i>	T,E ^b	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); <i>Sargassum</i> habitat including most of the central & western Gulf of America
Green turtle	<i>Chelonia mydas</i>	T	X	X	None
Leatherback turtle	<i>Dermochelys coriacea</i>	E	X	X	None
Hawksbill turtle	<i>Eretmochelys imbricata</i>	E	X	X	None
Kemp's ridley turtle	<i>Lepidochelys kempii</i>	E	X	X	None
Birds					
Piping Plover	<i>Charadrius melodus</i>	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	<i>Grus americana</i>	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Black-capped Petrel	<i>Pterodroma hasitata</i>	E	X	--	None
Rufa Red Knot	<i>Calidris canutus rufa</i>	T	--	X	None
Fishes					
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	T	X	--	None
Giant manta ray	<i>Mobula birostris</i>	T	X	X	None
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	<i>Epinephelus striatus</i>	T	--	X	Florida Keys, Puerto Rico, U.S. Virgin Islands
Smalltooth sawfish	<i>Pristis pectinata</i>	E	--	X	Southwest Florida
Invertebrates					
Elkhorn coral	<i>Acropora palmata</i>	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	<i>Acropora cervicornis</i>	T	--	X	Florida Keys and the Dry Tortugas

Table 7. (Continued).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of America
			Project Area	Coastal	
Pillar coral	<i>Dendrogyra cylindrus</i>	E	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Rough cactus coral	<i>Mycetophyllia ferox</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Lobed star coral	<i>Orbicella annularis</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Mountainous star coral	<i>Orbicella faveolata</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Boulder star coral	<i>Orbicella franksi</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Panama City crayfish	<i>Procambarus econfinae</i>	T	--	X	South-central Bay County, Florida
Queen conch	<i>Aliger gigas</i>	T	--	X	None
Terrestrial Mammals					
Beach mouse (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	<i>Peromyscus polionotus</i>	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	<i>Microtus pennsylvanicus dukecampbelli</i>	E	--	X	None

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

^aThere are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of America 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 America. On 30 March 2017, the USFWS announced the West Indian manatee, including the Florida manatee subspecies, was reclassified as Threatened.

^bThe 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).

Coastal Endangered or Threatened species that may occur along the northern Gulf Coast include the West Indian manatee, Piping Plover (*Charadrius melodus*), Rufa Red Knot (*Calidris canutus rufa*), Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*), Panama City crayfish (*Procambarus econfinae*), Whooping Crane (*Grus americana*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), smalltooth sawfish (*Pristis pectinata*), queen conch (*Aliger gigas*) and four subspecies of beach mouse. Critical habitat has been designated for all of these species (except the Florida salt marsh vole, Rufa Red Knot, and queen conch) as indicated in **Table 7** and discussed in individual sections.

The sperm whale (*Physeter macrocephalus*), the Rice's whale (*Balaenoptera ricei*), five species of sea turtles, the oceanic whitetip shark (*Carcharhinus longimanus*), giant manta ray (*Mobula birostris*), and the Black-capped Petrel (*Pterodroma hasitata*) are the only Endangered or Threatened species likely to occur in or near the project area. The listed sea turtles include the leatherback turtle (*Dermochelys coriacea*), Kemp's ridley turtle (*Lepidochelys kempii*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and green turtle (*Chelonia mydas*) (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.3.5**). No critical habitat has been designated in the Gulf of America for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, or the sperm whale. Five Endangered mysticetes (blue whale [*Balaenoptera musculus*], fin whale [*B. physalus*], humpback whale [*Megaptera novaeangliae*], North Atlantic right whale [*Eubalaena glacialis*], and sei whale [*B. borealis*]) have been reported in the Gulf of America, but are considered rare or extralimital (Würsig et al., 2000; Hayes et al., 2024). There is no Northern Gulf of America stock designated by NMFS for these species, and the most recent NMFS stock assessment reports (Hayes et al., 2020, 2022, 2024) do not list their ranges as including the Gulf of America. They are also not included in the most recent BOEM multisale EIS (BOEM, 2017a); therefore, they are not considered further in the EIA.

The Rice's whale (*B. ricei*) exists in the Gulf of America as a small, resident population. This species was formally known as a subspecies to the Bryde's whale (*B. edeni brydei*) until recent DNA studies identified it as a separate species (Rosel et al., 2021). It is the only baleen whale known to be a resident in the Gulf of America. The species is severely restricted in range, being found only in the northeastern Gulf in the waters of the DeSoto Canyon (Waring et al., 2016; Rosel et al., 2021). However, recent work by Soldevilla et al. (2022) suggests the range may be broader than previously thought (see **Section C.3.2**). The giant manta ray could occur in the project area but is most commonly observed in the Gulf of America at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of America at the Flower Garden Banks but is most commonly observed in shallow tropical reefs of the Caribbean and is not expected to occur in the project area. The smalltooth sawfish is a coastal species limited to shallow areas off the west coast of Florida and is not expected to occur in the project area.

There is only one Endangered coral species, the pillar coral (*Dendrogyra cylindrus*), while six Threatened coral species are known from the northern Gulf of America: elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicornis*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), and rough cactus coral (*Mycetophyllia ferox*). None of these species are expected to be present in the project area (**Section C.3.18**).

There are no other Threatened or Endangered species in the Gulf of America that are reasonably likely to be adversely affected by either routine or accidental events. The IPFs with potential impacts listed in **Table 2** are discussed below.

C.3.1 Sperm Whale (Endangered)

One of two Endangered marine mammal species 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 America; a species description is presented in the recovery plan for this species (NMFS, 2010b). Gulf of America 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
- Is listed as a Threatened or Endangered species under the ESA or is designated as depleted under the MMPA.

Current threats to sperm whale populations threats are defined as “any factor that could represent an impediment to recovery.” Current threats to sperm whale populations worldwide 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 America, 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 America population of the sperm whale as a DPS under the ESA but concluded that the designation of a Gulf of America DPS for sperm whales was not warranted (78 FR 68032).

The distribution of sperm whales in the Gulf of America 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 America are present throughout the year (Davis et al., 2000). 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 America 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 America 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 America population (within the 95% utilization distribution) (Jochens et al., 2008).

IPFs that may potentially affect sperm whales include installation vessel presence, underwater sound, and lights; support vessel and helicopter marine sound; support vessel collisions; 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 intended to minimize the potential for marine debris-related impacts on sperm whales.

Impacts of Installation Vessel and Subsea Equipment Presence, Marine Sound, and Lights

Underwater sound from routine installation activities (see **Section A.1**) 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 America (Azzara et al., 2013).

NMFS (2024) lists sperm whales in the same functional hearing group (i.e., high-frequency cetaceans) as most dolphins and other toothed whales, with an estimated hearing sensitivity from 150 Hz to 160 kHz. Therefore, installation vessel-related sound is likely to be heard by sperm whales. Frequencies <150 Hz produced by the installation vessel operations are not likely to be perceived with any significance by high-frequency cetaceans. The sperm whale may possess better low-frequency hearing than some of the other odontocetes, although not as low as many baleen whale species that primarily produce sounds between 30 Hz and 5 kHz (Wartzok and Ketten, 1999; Southall et al, 2019). Generally, most of the acoustic energy produced by sperm whale vocalizations is present at frequencies below 10 kHz, although diffuse energy up to and past 20 kHz is common, with sound pressure level (SPL) source levels up to 236 dB re 1 μPa m (Møhl et al., 2003).

Observations of sperm whales near offshore oil and gas operations suggest an inconsistent response to anthropogenic marine sound (Jochens et al., 2008). Most observations of behavioral responses of marine mammals to non-impulsive sources such as subsea equipment and machinery operations, in general, involve short-term behavioral responses, which included onset of avoidance behavior and the cessation of feeding, resting, or social interactions (Southall et al., 2021; NMFS, 2025a). Animals can determine the direction from which underwater 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 ability to avoid sound sources (National Research Council, 2003b).

NMFS (2024) presents criteria that may be used to determine auditory injury and temporary threshold shifts (TTS) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2024) and therefore, this assessment refers to thresholds published by NMFS in FR 70(7): 1871-1875 (NOAA, 2005) and summarized in NMFS (2025b). For high-frequency cetaceans exposed to non-impulsive sources (which include the proposed installation activities and subsea equipment operations), acoustic injury is estimated to occur when the animal has received a sound exposure level over 24 hours ($\text{SEL}_{24\text{h}}$) of 201 dB re 1 μPa^2 s. Similarly, TTS is estimated to occur when the animal has received an $\text{SEL}_{24\text{h}}$ of 181 dB re 1 μPa^2 s. Given the non-impulsive nature of DP vessels used during installation operations and the estimated source levels (**Section A.1**), sperm whales are unlikely

to be exposed to sound above the auditory injury threshold. While sound during installation operations may exceed the TTS threshold, it is expected that, due to the relatively stationary nature of these vessels, sperm whales would move away from the proposed operations area, reducing the duration that individuals are exposed to sound, further reducing the likelihood of TTS being realized. Therefore, due to transient nature of sperm whales and the stationary nature of installation activities, it is not expected that any sperm whales will remain in proximity to the source for a full 24-hour period to receive an SEL_{24h} necessary for the onset of auditory threshold shifts.

Underwater sound associated with proposed installation activities and subsea equipment operations may cause behavioral disturbance effects to sperm whales. Behavioral disturbance thresholds for marine mammals are applied equally across all functional hearing groups. Received SPL of 120 dB re 1 μ Pa from a non-impulsive source is considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. Based on the estimated source levels provided in **Section A.1**, the maximum estimated source level of 195 dB re 1 μ Pa m for sound produced by project operations may exceed the behavioral disturbance threshold out to 3.5 mi (5.6 km). However, in the case of behavioral responses, exposure to above-threshold sound levels alone does not indicate a behavioral response and, more importantly, does not equate to biologically important responses (Southall et al., 2021; Ellison et al., 2012).

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. Installation and subsea equipment operation-related underwater sound associated with this project will contribute to increases in the ambient marine sound environment of the Gulf of America, but it is not expected in amplitudes sufficient to result in auditory injuries to sperm whales (Hildebrand, 2005). The proposed activity may cause disturbance effects, primarily avoidance or temporary displacement from the project area. Installation vessel and subsea equipment lighting and presence were not identified as IPFs that were likely to adversely affect sperm whales in previous programmatic assessments (BOEM, 2016a; 2017a; NMFS 2025a).

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, 2010b). To reduce the potential for vessel strikes, BOEM issued the NTL 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 100 m (328 ft) or greater from the sighted animal whenever possible (NMFS, 2025a). 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 of disturbing sperm whales.

NMFS (2025a) analyzed the potential for vessel collisions and harassment of sperm whales in its Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of America. 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 level of the population. With the implementation of the NMFS vessel collision protocols listed in Attachment 3 of NMFS (2025a) in addition to the NTL BOEM 2016-G01, NMFS (2025a) concluded that the likelihood of collisions between vessels and sperm whales would be reduced during daylight hours. During nighttime and during periods of poor visibility, it is assumed that vessel sound and sperm whale avoidance of moving vessels would reduce the chance of vessel collisions with this species. It is, however, likely that a collision between a sperm whale and a moving support vessel would result in severe injury or mortality of the stricken animal. The current potential biological removal (PBR) level for the Gulf of America stock of sperm whales is 2.0 (Hayes et al., 2021). The PBR level is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. NMFS (2025a) estimated that there would be 4 non-lethal takes and 12 lethal vessel strikes over the course of 45 years. Mortality of a single sperm whale would constitute a significant impact to the local (Gulf of America) stock of sperm whales but would not likely be significant at the species level.

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, the authors 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 America, 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 (2025a) concluded that this altitude would minimize the potential for disturbing sperm whales. Therefore, no significant impacts are expected.

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2025a) and BOEM (2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the Marine Mammal Commission [MMC] (2011) with discussions germane to the Gulf of America 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 DOCD, 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 (NOAA, 2022). 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.

The probability of a fuel spill will be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP will mitigate and lessen the potential for impacts on sperm whales. Given the open ocean location of the project area, the duration of a small spill and therefore potential for impacts to occur would be very brief.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2025a) and BOEM (2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). For this DOCD, 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, 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., 2019). 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 are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for striking or disturbing these animals.

C.3.2 Rice's Whale (Endangered)

The other Endangered marine mammal species likely to be present at or near the project area is the Rice's whale (*Balaenoptera ricei*). A study by Rosel et al. (2021), identified the genetically distinct northern Gulf of America Bryde's whale stock as a new species of baleen whale named the Rice's whale through DNA analysis. The reclassification was approved by NMFS under 86 FR 47022 and was effective 22 October 2021. It is the only year-round resident baleen whale in the northern Gulf of America, most frequently sighted in the waters over the DeSoto Canyon between the 100 m (328 ft) and 400 m (3,280 ft) isobaths (Rosel et al., 2016; Hayes et al., 2023).

In 2014, a petition was submitted to designate the northern Gulf of America 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 a proposed rule to list was published in 2016 (81 FR 88639). On 15 April 2019, NMFS issued a final rule to list the Gulf of America DPS of Rice's whale as Endangered under the ESA (84 FR 15446). The listing was effective on 15 May 2019. In 2023, the NMFS proposed designated critical habitat for the Rice's whale (NMFS, 2023). This habitat included both the northwestern and northeastern Gulf of America, extending from the 100 to 400 m isobaths (NMFS, 2023); a formal decision on this designation has not yet been made (NMFS, 2025a).

Most sightings 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 of America. Soldevilla et al. (2022, 2024) identified new variants of long-moan calls along the northwestern Gulf of America shelf break that were determined to share distinctive features with typical eastern Gulf of America long-moan calls. In 2017, a large whale was sighted off the coast of Corpus Christi, Texas during a research cruise (Rappucci et al., 2019). A tissue biopsy was conducted, and analysis confirmed this sighting was of a Rice's whale (Rosel et al., 2021). This genetically confirmed sighting along with the newly identified long-moan calls in the northwestern Gulf of America indicates that Rice's whales may occur in a broader range in the Gulf of America than previously known and this broader range should be considered when designating critical habitat. It is not currently possible to differentiate between Rice's whales and Bryde's whales without performing DNA sampling or by examining the skull from a deceased specimen. For the purposes of mitigation, any Bryde's whale complex individual detected would be treated as a possible Rice's whale.

Kiszka et al. (2023) studied the drivers of resource selection by Rice's whale in relation to prey availability and energy density. The study indicated that Rice's whales are selective predators consuming schooling prey with the highest energy content (i.e., silver rag [*Ariomma bondi*]). The silver rag is found at a depth range of 25 to 640 m (82 to 2,100 ft) primarily over muddy bottoms on the OCS though juveniles can be within the surficial waters (Smithsonian Tropical Research Institute, 2015). Therefore, it is unlikely that Rice's whales would occur in the project area. However, support vessels transiting through the 25 to 640 m (82 to 2,100 ft) water depths could encounter a Rice's whale, although unlikely given the rate of sightings of the whales.

Although it is unlikely that the Rice's whales would occur in the project area, IPFs that could affect the Rice's whales include installation vessel and subsea equipment presence, marine sound, and lights; support vessel and helicopter traffic; and both types of spill accidents: a small fuel spill and a large oil spill. Effluent discharges are likely to have negligible impacts on Rice's whales due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility and low abundance of Rice's whales in the Gulf of America. Though NMFS (2025a) stated marine debris as an IPF, compliance with BSEE-NTL 2015-G03 and NMFS (2025a) Attachment 2 will minimize the potential for marine debris-related impacts on Rice's whales. NMFS (2025a) estimated no lethal takes of Rice's whale from marine debris over 45 years of proposed action. Therefore, marine debris is likely to have no more than negligible impacts on Rice's whales and is not further discussed.

Impacts of Installation Vessel and Subsea Equipment Presence, Marine Sound, and Lights

NMFS (2024) lists Rice's whales in the functional hearing group of low-frequency cetaceans (baleen whales), with an estimated hearing sensitivity from 7 Hz to 36 kHz. Noise produced by the installation vessel may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. Sound associated with installation activities are relatively weak in intensity relative to impulsive sources such as airgun sound, and an individual animal's sound exposure would be temporary.

NMFS (2024) presents criteria that are used to determine auditory injury and TTS thresholds for marine mammals. For low-frequency cetaceans, specifically the Rice's whale, auditory injury and TTS onset from non-impulsive sources is estimated to occur at SEL_{24h} (cumulative sound exposure level over 24 hours) of 197 dB re 1 $\mu Pa^2 s$ and 177 re 1 $\mu Pa^2 s$, respectively. Given the non-impulsive nature of installation operations and DP vessel sound and the estimate source levels, Rice's whales are unlikely to be exposed to noise above the auditory injury threshold. While sound during installation operations may exceed the TTS threshold, it is expected that, due to the relatively stationary nature of the installation vessel and support vessels, Rice's whales would move away from the proposed operations area, reducing the duration that individuals are exposed to project-related underwater sound, further reducing the likelihood of auditory injuries being realized.

Additionally, the project area is in the Central Gulf of America OCS Planning Area, approximately 64 statute miles (103 km) from the nearest shoreline in Louisiana and outside the main distribution range identified for this species (88 FR 47453; NOAA Fisheries, 2023a) so it is unlikely this species will be exposed to sound associated with the project. Therefore, due to the short propagation distance of above-threshold SEL_{24h} , the stationary nature of the proposed activities, and the low likelihood of encountering this species in the project area, it is not expected that any Rice's whales will receive exposure levels necessary for the onset of auditory threshold shifts.

Received SPL of 120 dB re 1 μPa from non-impulsive, continuous sources are considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. Based on the estimated source levels provided in **Section A.1**, the maximum estimated source level of 195 dB re 1 μPa m for sound produced by project operations may exceed the behavioral disturbance threshold out to 3.5 mi (5.6 km). However, exposure to SPL of 120 dB re 1 μPa does not alone equate to a behavioral response or a biological consequence; rather it represents the level at which onset of a behavioral response may occur that, more importantly, may not result in biologically significant responses (Southall et al., 2016; Ellison et al., 2012).

Marine sound associated with this project may contribute to increases in the ambient sound environment of the region but are not expected to cause significant adverse sound-related impacts to Rice's whales. Vessel lighting and presence are not expected to adversely impact Rice's whales (BOEM, 2017; NMFS, 2025a).

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb Rice's whales and create the potential for vessel collisions. Kiszka et al. (2023) indicated through Bayesian stable isotope mixing models that Rice's whales primarily feed on silver rag found between 25 and 640 m (82 and 2,100 ft) water depths. Although it is unlikely support vessels will encounter Rice's whale given that they are primarily found over DeSoto Canyon between the 100 m (328 ft) and 1,000 m (3,280 ft) isobaths (Rosel et al., 2016; Hayes et al., 2021).

To reduce the potential for vessel collisions, BOEM has issued NTL BOEM-2016-G01, which recommends protected species identification training, and that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid colliding with protected species and requires operators to report sightings of any injured or dead protected species. bp intends to follow the mitigation measures summarized in Attachment 3 of the 2025 Biological Opinion (NMFS, 2025a).

Per the 2025 Biological Opinion, any transit through the Rice's Whale Area (RWA), as identified in the 2020 Biological Opinion, requires a visual observer, either third-party or crew with sufficient training, maintaining vigilant watch for Rice's whales and other marine mammals when within the RWA (NMFS, 2025a). Other requirements when transiting through the RWA include a 10-knot year-round speed restriction, no transit at night or during low visibility, and an operating Automated Identification System system onboard for vessel associated with oil and gas activity and 65 feet or greater (NMFS, 2025a). After the completion of transit, a post-transit report for any Rice's whales or other marine mammals must be submitted (NMFS, 2025a). Any deviation from these requirements (such as for an emergency regarding safety of the vessel or crew) requires reporting to BSEE and BOEM within 24 hours (NMFS, 2025a).

When whales are sighted, vessel operators and crews are required to maintain a distance of 500 m (1,640 ft) or greater whenever possible (NTL BOEM-2016-G01; NMFS, 2025a). Vessel operators are required to reduce vessel speed to 10 knots or less, as safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel (NTL BOEM-2016-G01). When a Rice's whale or potential Rice's whale (NMFS, 2025a) is sighted while a vessel is underway, the vessel should take action (e.g., attempt to remain parallel to the whale's course, avoid excessive speed or abrupt changes in direction until the whale has left the area) as necessary to avoid violating the relevant separation distance. However, if the whale is sighted within this distance, the vessel should reduce speed and shift the engine to neutral and not re-engage until the whale is outside of the separation area. This does not apply to any vessel towing gear (NMFS, 2025a, Appendix 1).

The current PBR level for the Gulf of America stock of Rice's whale is 0.07 (Hayes et al., 2023). NMFS (2025a) estimated no incidental take by vessel strikes would occur for Rice's whales over 45 years of proposed action as mortality of a single Rice's whale would constitute a significant impact to the local (Gulf of America) stock of Rice's whales. However, as noted previously, it is very unlikely that Rice's whales will be encountered within the project area, including the transit corridor for support vessels; consequently, the probability of a vessel collision with this species during the project is extremely low.

Helicopter traffic also has the potential to disturb Rice's whales. Based on studies of cetacean responses to sound, the observed responses to brief overflights by aircraft were short term and limited to behavioral disturbances (Smultea et al., 2008). Helicopters maintain altitudes above 213 m (700 ft) during transit to and from the offshore working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animal(s). In addition, guidelines and regulations issued by NMFS under the authority of the MMPA specify that helicopters maintain an altitude of 305 m (1,000 ft) within 500 m (1,640 ft) of Rice's whales (BOEM, 2016a; 2017a; NMFS, 2025a). Due to the brief potential for disturbance the low density of Rice's whales thought to reside in the Gulf of America, no significant impacts are expected.

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by NMFS (2025a) and BOEM (2012a; 2015; 2016b; 2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). In the unlikely event of a spill, implementation of bp's ROSRP will mitigate and reduce the potential for impacts on Rice's whales. Given the open ocean location of the project area and the duration of a small spill, any impacts are expected to be 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. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill as well as the effectiveness of spill response measures.

Section A.9.1 discusses the likely fate of a small fuel spill and indicates that more than 90% would evaporate or disperse naturally within 24 hours (NOAA, 2022). The area of diesel fuel on the sea surface would range from 1.2 to 12 ac (0.5 to 5 ha), 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 noise 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 Rice's whales and the unlikelihood of occurrence in the project area, no significant impacts are expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a; 2015; 2016b; 2017a), and NMFS (2025a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011).

Potential impacts of a large oil spill on Rice's whales could include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, noise, dispersants) (MMC, 2011). Direct physical and physiological effects could 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 noise 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., 2019).

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 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 Rice's whales and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking or disturbing these animals.

C.3.3 West Indian Manatee (Threatened)

Most of the Gulf of America manatee 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, 2023). A species description is presented in the West Indian manatee recovery plan (U.S. Fish and Wildlife Service, 2001) and stock assessment report (U.S. Fish and Wildlife Service, 2023). Critical habitat has been designated for this stock in various rivers and bays around Florida (89 FR 78134).

Manatee sightings in Louisiana have increased as the species extends its presence farther west of Florida in the warmer months (Wilson, 2003). 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 (USFWS, 2001a; Fertl et al., 2005; Pabody et al., 2009). There have been three verified reports of Florida manatee sightings on the OCS during seismic mitigation surveys in mean water depths of over 600 m (1,969 ft) (Barkaszi and Kelly, 2019).

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 dissipating. Compliance with BSEE-NTL 2015-G03 is intended 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 stock assessment report for this species (USFWS, 2023a). Manatees are expected to be limited to 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 intended to minimize the likelihood of vessel strikes. No significant impacts on manatees are expected.

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 100 m (328 ft) of marine mammals (BOEM, 2017a). This mitigation measure will minimize the potential for disturbing manatees. No significant impacts are expected.

Impacts of a Large Oil Spill

The potential for significant impacts to manatees from a large oil spill would be most likely associated with coastal oiling in areas of manatee habitats. 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 and Florida shorelines 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, Texas, and Levy County, Florida, may be contacted within 60 days of a spill. This range does not include areas of manatee critical habitat in southwestern Florida.

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 availability and 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.3.4 Non-Endangered Marine Mammals (Protected)

Excluding the three Endangered and Threatened species that have been cited previously, there are 20 additional species of marine mammals that may be found in the Gulf of America, including dwarf and pygmy sperm whales, four 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).

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 America, both species occur primarily along the continental shelf edge and in deeper waters off the continental shelf (Mullin et al., 1991; Mullin, 2007; Garrison et al., 2020; Hayes et al., 2021). Either species could occur in the project area.

Beaked whales. Four species of beaked whales are known to occur in the Gulf of America: 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 America (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 America (Bonde and O'Shea, 1989). Blainville's beaked whales are rare, with only four documented strandings in the northern Gulf of America (Würsig et al., 2000).

Due to the difficulties of at-sea identification, beaked whales in the Gulf of America are identified either as Cuvier's beaked whales or are grouped into an undifferentiated species complex (*Mesoplodon* spp.). In the northern Gulf of America, they are broadly distributed in water depths greater than 1,000 m (3,281 ft) over lower slope and abyssal landscapes (Davis et al., 2000; Hildebrand et al., 2015; Garrison et al., 2020; Hayes et al., 2021). Any of these species could occur in the project area (Hayes et al., 2021).

Delphinids. Fourteen species of delphinids are known from the Gulf of America, 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 (Hayes et al., 2021, 2022, 2023, 2024).

The bottlenose dolphin (*Tursiops truncatus*) is a common inhabitant of the northern Gulf of America, 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 (Hayes et al., 2021, 2022). The offshore form of the bottlenose dolphin may occur within the

project area. Inshore populations of coastal bottlenose dolphins in the northern Gulf of America are separated into 31 geographically distinct population units, or stocks, for management purposes by NMFS (Hayes et al., 2023).

IPFs that potentially may affect non-endangered marine mammals include installation vessel 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 Installation Vessel and Subsea Equipment Presence, Marine Sound, and Lights

The presence of the installation vessel 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. Installation and support vessel presence and lighting are not considered as IPFs for marine mammals (BOEM, 2017a).

If the vessel(s) are equipped with a moon pool, a trained crew member or company representative must monitor the moon pool area for marine mammals during operations. If a marine mammal is detected in the moon pool, immediate reporting to NMFS, BOEM, and BSEE is required (NMFS, 2020a, 2025a). Recovery may be required if a protected species is observed in a moon pool before the start of operations; a report must be made to BSEE upon observation and NMFS will determine the recovery need (NMFS, 2025a).

Sound from routine installation operations has the potential to disturb marine mammals. As discussed in **Section A.1**, sound impacts would be expected at greater distances when DP thrusters are in use than with vessel and installation sound alone and are dependent on variables relating to sea state conditions, thruster type and usage. Three functional hearing groups are represented in the 20 non-endangered cetaceans found in the Gulf of America. Eighteen of the 20 odontocete species are considered to be in the high-frequency functional hearing group and two species (*Kogia* spp.) are in the very high-frequency functional hearing group (NMFS, 2024). Thruster and installation sound will affect each group differently depending on the frequency bandwidths produced by operations. Generally, sound produced by vessels on DP is dominated by frequencies below 10 kHz. Thus, installation vessel DP sound sources have less overlap with the audible range for the high-frequency and very high-frequency groups.

For high-frequency cetaceans exposed to a non-impulsive source (like installation operations), auditory injury is estimated to occur when the mammal has received an SEL_{24h} of 201 dB re $1 \mu Pa^2$ s over a 24-hour period. Similarly, TTS is estimated to occur when the mammal has received an SEL_{24h} of 181 dB re $1 \mu Pa^2$ s. Given the non-impulsive nature of installation vessel activities and subsea equipment operations and the estimate source levels, marine mammals are unlikely to be exposed to sound above the auditory injury threshold. While sound originating from installation operations may exceed the TTS threshold, it is expected that marine mammals

would move away from the operations area, reducing the duration that individuals are exposed to project-related underwater sound, further reducing the likelihood of auditory injuries being realized. Therefore, due to the short propagation distance of above-threshold SEL_{24h}, the transient nature of marine mammals and the stationary nature of the proposed activities, it is not expected that any marine mammals will receive exposure levels necessary for the onset of auditory threshold shifts.

NMFS (2024) presents criteria used to determine auditory injury thresholds for marine mammals, but the behavioral disturbance thresholds were not updated in this most recent acoustic guidance; these behavioral disturbance thresholds are established and published by NMFS in 70 FR 1871 and summarized in NMFS (2025b). Received SPL of 120 dB re 1 μ Pa from a non-impulsive, continuous source is considered high enough to elicit a behavioral reaction in some marine mammal species. Based on the estimated source levels provided in **Section A.1**, the maximum estimated source level of 195 dB re 1 μ Pa m for sound produced by project operations may exceed the behavioral disturbance threshold out to 3.5 mi (5.6 km). However, in the case of behavioral responses, received levels alone do not indicate a behavioral response and, more importantly, do not equate to biologically important responses (Southall et al., 2016; Ellison et al., 2012).

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 America 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). Due to the limited scope, timing, and geographic extent of installation activities, this project would represent a small, temporary contribution to the overall noise regime, and any short-term behavioral impacts are not expected to be biologically significant to marine mammal populations. Support vessel lighting and presence are not identified as IPFs that would adversely affect marine mammals by BOEM (2017a) or NMFS (2025a).

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 collisions. Data concerning the frequency of vessel collisions are presented by BOEM (2012a). To reduce the potential for vessel collisions, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessels operators and that vessels slow down or stop to avoid colliding with protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL; a new NTL in response to the 2025 Biological Opinion has not yet been issued. However, bp intends to follow the mitigation measures summarized in Attachment 3 of the 2025 Biological Opinion (NMFS, 2025a). NTL 2016-G01 also required 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 100 m (328 ft) or greater when toothed whales are sighted and 50 m (164 ft) when small cetaceans are sighted (NMFS, 2020a, 2025a Attachment 3). 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. All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m (164 ft) from all “other aquatic protected species” including sea turtles, with an exception made for those animals that approach the vessel. Vessel speeds must also be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages (greater than three) of any marine mammal are observed near a vessel. Although vessel strike avoidance measures described in NMFS (2020a, 2025a) are only applicable to ESA listed species, complying with them may provide additional indirect protection to non-listed species as well.

When aquatic protected species are sighted while a vessel is underway, the vessel should take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal’s course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If aquatic protected species are sighted within the relevant separation distance, the vessel should reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear (e.g., source towed array, site clearance trawling). Use of these measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing marine mammals, and therefore no significant impacts are expected.

The current PBR level for several of the non-endangered cetacean species in the Gulf of America are less than three individuals (e.g., rough-toothed dolphin = undetermined, Clymene dolphin = 2.5, Fraser’s dolphin = 1.0, killer whale = 1.5, pygmy and false killer whales = 2.8, dwarf and pygmy sperm whales = 2.5) (Hayes et al., 2021, 2022). Mortality of individuals equal to or in excess of their PBR level would constitute a significant impact at a population level on the local (Gulf of America) stocks of these species. For the remainder of the non-endangered cetacean species in the Gulf of America, PBR is greater than five individuals (Hayes et al., 2021, 2022, 2023).

Aircraft traffic also 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 100 m (328 ft) of marine mammals (BOEM, 2012a; 2016a; NMFS, 2025a). Maintaining this altitude will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2017a; NMFS, 2025a).

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a; 2015; 2016b) and NMFS (2025a). Oil impacts on marine mammals in general are discussed by Geraci and St. Aubin (1990). For this DOCD, 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 fuel transfer. In the unlikely event of a spill, implementation of bp’s ROSRP is expected to lessen the potential for impacts on marine mammals. DOCD 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 relatively thin slick 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 dissipating (**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). For this DOCD, 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, 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. Complications of the above may lead to dysfunction of immune and reproductive systems (De Guise et al., 2017), physiological stress, declining physical condition, and death. Indirect impacts could 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 and remediation activities (e.g., use of dispersants, controlled burns, skimmers, boom,) (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 are expected to 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.

This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) and amendment in April 2021 (NMFS, 2021a) replaces compliance with the NTL; a new NTL has not yet been issued in response to the 2025 Biological Opinion. However, bp intends to follow the mitigation measures summarized in Attachment 3 of the 2025 Biological Opinion (NMFS, 2025a). 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, 2017). Based on the current PBR level for several non-endangered cetacean species in the Gulf of America that are less than three individuals (e.g., rough-toothed dolphin = undetermined, Clymene dolphin = 2.5, Fraser's dolphin = 1.0, killer whale = 1.5, pygmy and false killer whales = 2.8, dwarf and pygmy sperm whales = 2.5) (Hayes et al., 2021, 2022), mortality of individuals equal to or in excess of their PBR level would

constitute a significant impact at the population level to the local (Gulf of America) stocks of these species.

C.3.5 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. 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 America is listed as Threatened, although other DPSs are Endangered.

Critical habitat has been designated for the loggerhead turtle in the Gulf of America as shown in **Figure 3**. Loggerhead turtles in the Gulf of America 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, 2014). 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 0.99 miles (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 America (and Atlantic Ocean) as critical habitat. *Sargassum* is a brown algae (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; 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, 2014).

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 134 statute miles (216 km) north of the project area. The project area is located within the designated *Sargassum* critical habitat for loggerhead sea turtles (**Figure 3**).

In 2023, NMFS proposed critical habitat for the Northwest Atlantic DPS of green turtles (NMFS, 2025a). Like the designation for the loggerhead turtle, this includes nearshore reproductive habitat and *Sargassum* habitat (NMFS, 2025a). The nearshore reproductive habitat is from mean water to 20 m of water along the shores of parts of Texas, southeastern Alabama, and all of Florida (NMFS, 2025a). The *Sargassum* habitat covers most of the northern Gulf of America to the edge of the US Exclusive Economic Zone (EEZ) (NMFS, 2025a). Neither critical habitat for the green turtle has been formally designated.

Leatherbacks are the species most likely to be present near the project area, as they are the most pelagic of the sea turtles and feed on populations of gelatinous plankton, such as jellyfish and salps in all water depths. Loggerhead, green, hawksbill, and Kemp's ridley turtles are typically inner shelf and nearshore species but may be found transiting in oceanic waters during seasonal migrations. Loggerheads and green turtles are more likely to occur or be attracted to offshore structures than the other species. Hatchlings or juveniles of any of the sea turtle species with the exception of leatherbacks may be present in deepwater areas, including the project area, where they may be associated with *Sargassum* rafts and other flotsam.

Leatherbacks, while not specifically associated with Sargassum, do utilize similar pelagic habitats for foraging where Sargassum is routinely found. All five sea turtle species in the Gulf of America 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.

Sea turtle nesting in the northern Gulf of America 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 turtles – Green turtles are known to nest along the Florida Panhandle and in southwest Florida, from Tampa Bay south to Ten Thousand Island, and in the Florida Keys and Dry Tortugas (Florida Fish and Wildlife Conservation Commission, 2018b);
- Leatherback turtles – Leatherback turtles infrequently nest on Florida Panhandle beaches (Florida Fish and Wildlife Conservation Commission, 2018c);
- 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 et al., 2011). A much smaller population nests in Padre Island National Seashore, Texas, mostly as a result of reintroduction efforts (NMFS et al., 2011). To date, 449 Kemp’s ridley turtle nests have been counted on Texas beaches in 2025. A total of 340 nests were counted on Texas beaches in 2024 (Turtle Island Restoration Network, 2025). These nest counts are an increase from 2023 and 2022, when a total of 256 Kemp’s ridley turtle nests were counted on Texas beaches in 2023 and a total of 284 Kemp’s ridley turtle nests were counted during the 2022 nesting season. 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; and
- 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 (NOAA Fisheries, nd-a).

IPFs that could potentially affect sea turtles include installation vessel 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 not expected to have more than negligible impacts on sea turtles due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges. Though NMFS (2025a) stated marine debris as an IPF, compliance with NTL BSEE 2015-G013 and NMFS (2025a) Attachment 2 will minimize the potential for marine debris-related impacts on sea turtles. NMFS (2025a) estimated a small proportion of individual sea turtles would be adversely affected from exposure to marine debris. Therefore, marine debris is likely to have no more than negligible impacts on sea turtles and is not further discussed.

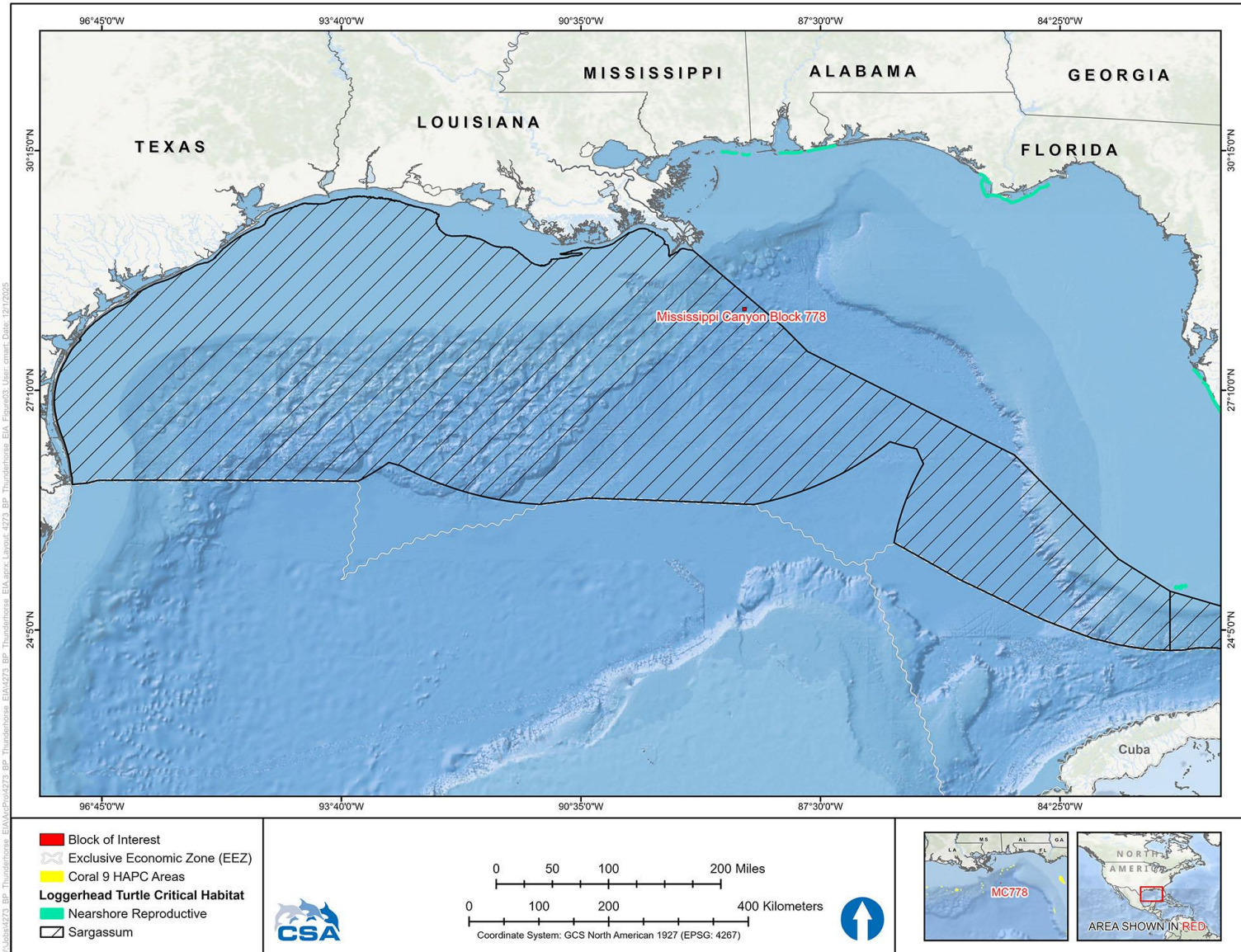


Figure 3. Location of loggerhead sea turtle designated critical habitat in relation to the project area.

Impacts of Installation Vessel and Subsea Equipment Presence, Marine Sound, and Lights

Installation 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). Potential impacts may include behavioral disruption and temporary or permanent displacement from the area near the sound source. Sea turtles can hear low to mid-frequency sounds and they appear to hear best between 200 and 750 Hz; they do not respond well to sounds above 2,000 Hz, although primary hearing frequency ranges vary per species and life stage (Ketten and Bartol, 2005; Dow Piniak et al., 2012a,b; Martin et al., 2012; Piniak et al., 2016).

NMFS (2025d), which uses threshold estimates from Accomando et al. (2025), recommends SEL_{24h} auditory injury and TTS thresholds of 198 and 178 dB re 1 $\mu Pa^2 s$, respectively, for non-impulsive sources, and an SPL behavioral threshold of 175 dB re 1 μPa for all sound sources. Based on the assessment conducted in the NMFS Biological Opinion (NMFS, 2025), as well as the estimated source levels for installation operations relative to the acoustic thresholds for sea turtles, there is a minimal likelihood of acoustic injury such as auditory injury in sea turtles, and behavioral responses to sounds produced by activities such as vessel operations are not expected beyond 10 m (33 ft) from the source. Certain sea turtles, especially loggerheads, may be attracted to offshore structures (Lohoefer et al., 1990; Gitschlag et al., 1997; Colman et al., 2020) and thus may be more susceptible to impacts from sounds produced during routine installation activities. Any impacts would likely be short-term behavioral changes such as diving and evasive swimming, disruption of activities, or departure from the area. Because of the limited scope and short duration of installation 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 (Tuxbury and Salmon, 2005; Berry et al., 2013; Simões et al., 2017). 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.

NMFS (2025a) reports that sea turtles can become temporarily entrapped in vessel moon pools, which may cause sublethal effects, so vessels with moon pools must have trained personnel monitor the area and immediately report any turtle observations to NMFS, BOEM, and BSEE and follow all agency guidance. If a turtle is detected before operations begin, NMFS will determine whether recovery is required. Based on past entrapment cases and successful rescues, NMFS estimates about one sublethal moon pool entrapment per year over the 45-year action, with no significant impacts expected.

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 collisions. Data show that vessel traffic is one cause of sea turtle mortality in the Gulf of America (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 collisions, BOEM issued NTL BOEM-2016-G01, which addresses 1) protected species identification training; 2) vessel operators and crews' observational vigilance and protected species collision avoidance; and 3) reporting of sightings of any injured or dead protected

species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) and amendment in April 2021 replaces compliance with the NTL; a new NTL has not been issued in response to the 2025 Biological Opinion. However, bp intends to follow the mitigation measures summarized in Attachment 3 of the 2025 Biological Opinion (NMFS, 2025a).

When sea turtles are sighted, vessel operators and crews must, to the maximum extent possible, attempt to maintain a distance of 50 m (164 ft) or greater whenever possible (NMFS, 2021a; 2025a). When sea turtles are sighted while a vessel is underway, the vessel should take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If aquatic protected species are sighted within the relevant separation distance, the vessel should reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear (e.g., source towed array and site clearance trawling; NMFS, 2025a, Appendix 1). Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing sea turtles. Therefore, no significant impacts are expected.

Underwater sound 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 should minimize the potential for disturbing sea turtles, and no significant impacts are expected (NMFS, 2020; BOEM, 2012a).

Impacts of a Small Fuel Spill

Potential spill impacts on sea turtles are discussed by NMFS (2025a) and BOEM (2017a). For this DOCD, 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 ROSRP is expected to minimize potential impacts on sea turtles. DOCD Section 9 provides details 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, 2025a). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release 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 (NOAA, 2022). 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.

Loggerhead Critical Habitat – Nesting Beaches. 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 134 statute miles (216 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.

Loggerhead Critical Habitat – *Sargassum*. The project area is within the designated *Sargassum* critical habitat for the loggerhead turtles (**Figure 3**) and could be impacted in the event of a small diesel fuel spill. If juvenile sea turtles come into contact with or ingest diesel oil, impacts could include 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 America. However, if juvenile sea turtles are present in the area impacted, substantial impacts to the regional population could occur.

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 (e.g., vessel traffic, marine sound, dispersant use). 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, 2020b). In the unlikely event of a spill, implementation of bp's ROSRP is expected to minimize the potential for these types of impacts on sea turtles. DOCD 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. Sea turtles 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 Texas, Louisiana, or Florida shorelines that support significant loggerhead sea turtle nesting is 37% or less.

Loggerhead Critical Habitat – *Sargassum*. The project area is within the loggerhead turtle critical habitat designated as *Sargassum* habitat, which includes most of the Western and Central Planning Areas in the Gulf of America and parts of the southern portion of the Eastern Planning Area (**Figure 3**) (NMFS, 2014). Because of the large area covered by the designated *Sargassum* critical habitat for loggerhead turtles, a large spill could result in a substantial part of the *Sargassum* critical habitat in the northern Gulf of America being oiled. However, the 2010 *Deepwater Horizon* spill affected approximately one-third of the *Sargassum* habitat in the northern Gulf of America (BOEM, 2014). It is extremely unlikely that the entire *Sargassum* critical habitat would be affected by a large spill. Because *Sargassum* spp. is a floating, pelagic species, it would only be affected by impacts that occur near the surface.

The effects of oiling on *Sargassum* spp. 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* spp. also 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 effects, including a reduction in growth, productivity, and recruitment of organisms associated with *Sargassum* spp. The *Sargassum* spp. 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* spp. has a yearly seasonal cycle of growth and a yearly cycle of migration from the Gulf of America 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* spp. 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 are expected to operate in accordance with NTL BOEM-2016-G01 which is intended to reduce the potential for striking or disturbing sea turtles.

C.3.6 Piping Plover (Threatened)

The Piping Plover (*Charadrius melodus*) is a migratory shorebird that overwinters along the southeastern U.S. and Gulf of America coasts. This Threatened species experienced declines in population as a result of hunting, habitat loss and modification, predation, and disease (USFWS, 2003). However, as a result of intensive conservation and management, populations of Piping Plover appear to have been increasing since 1991 throughout its range (Bird Life International, 2020). 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 (USFWS, 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 dissipating (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 66 statute miles (106 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 spring, there is up to 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). 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. Extensive resources are available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in bp's ROSRP.

C.3.7 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 overwinters 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 536 at Aransas NWR during the 2022 to 2023 winter (USFWS, 2023b), a slight decrease from an estimated 543 individuals counted in the 2021 to 2022 winter survey. 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 (USFWS, 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.

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.

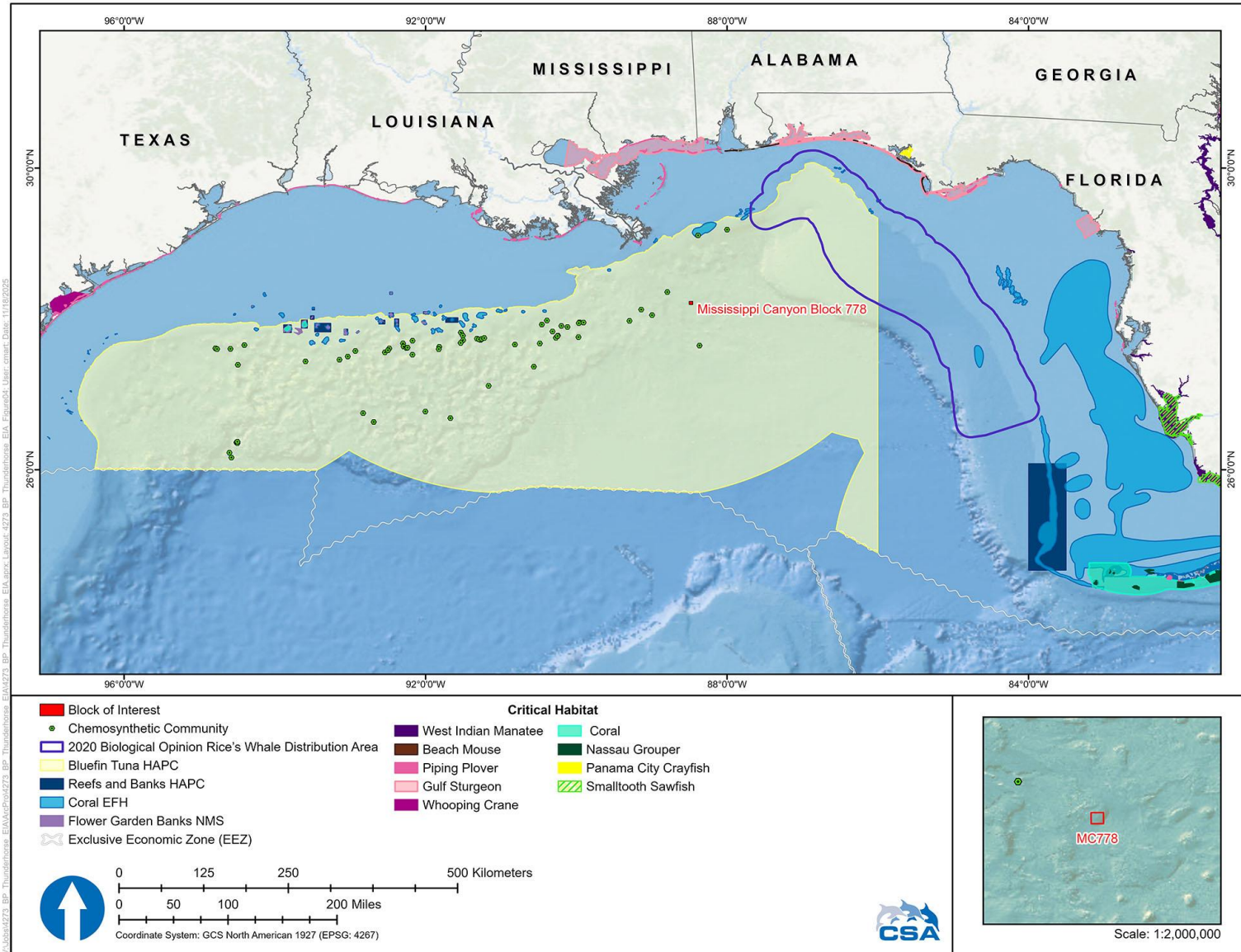


Figure 4. Location of selected environmental features in relation to the project area.

Impacts of a Large Oil Spill

A large oil spill is unlikely to affect Whooping Cranes as the project area is approximately 486 statute miles (782 km) from the Aransas NWR, which is the nearest designated critical habitat. The 60-day OSRA modeling (**Table 5**) predicts a <0.5% or less chance of 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 shellfish, frogs, and fishes. 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. Extensive resources are available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in bp's ROSRP.

C.3.8 Black-capped Petrel

The Black-capped Petrel is a pelagic seabird that nests solely on Hispaniola that was listed as Endangered under the ESA in 2024. The species travels long distances to forage on fish, squid, crustaceans, and *Sargassum* (Simons et al., 2013) and have occasionally been sighted in the northern Gulf of America. While the Gulf of America is not their primary foraging grounds, the most recent species status review (USFWS, 2023c) reported 11 sightings in the Gulf of America from 2017 to 2018 during surveys as part of the Gulf of Mexico Marine Assessment Program for Protected Species. Overall, the population of Black-capped Petrels is declining, largely due to deforestation and urbanization on Hispaniola. Exact population numbers are unknown due to the difficulty in obtaining accurate counts and their nocturnal nature, but BirdLife International (2018) estimated a total of 1,000 to 2,000 mature individuals and an overall population of 2,000 to 4,000 individuals.

IPFs that potentially may affect the Black-capped Petrel include installation vessel 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. The IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Installation Vessel and Subsea Equipment Presence, Marine Sound, and Lights

Marine birds that frequent offshore oil and gas 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 collide with offshore structures, resulting in injury and/or death (Wiese et al., 2001; Russell, 2005). Black-capped Petrels may be attracted to lights on the installation vessel which could increase the risk of a collision.

Mortality of migrant birds at tall towers and other land-based structures has been reviewed extensively, and the mechanisms involved in offshore vessel collisions appear to be similar. In some cases, birds simply do not see a part of the structure 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 species (Russell, 2005). Due to the low density of Black-capped Petrels in the Gulf of America, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb Black-capped Petrels in open, offshore waters. Schwemmer et al. (2011) showed that several marine bird species showed behavioral responses and altered distribution patterns in response to ship traffic, which could potentially cause loss of foraging time and resting habitat. However, it is likely that individuals would experience, at most, only short-term behavioral disruption, and the impact would not be significant on Black-capped Petrels.

Impacts of a Small Fuel Spill

Potential spill impacts on marine birds in general are discussed by BOEM (2017). For this DOCD, there are no unique site-specific issues with respect to spill impacts on Black-capped Petrels.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential for impacts on Black-capped Petrels. Appendix G provides details 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 Black-capped Petrels 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 (NOAA, 2022a). 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.

Black-capped Petrels exposed to fuel 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 Black-capped Petrels, the small area affected, and the brief duration of the surface slick, minimal if any impacts would be expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine and pelagic birds in general are discussed by BOEM (2017). For this DOCD, there are no unique site-specific issues with respect to spill impacts on Black-capped Petrels.

Black-capped Petrels could be exposed to oil from a spill at the project area; the number of individuals that could be affected in open, offshore waters would depend on the extent and persistence of the oil slick and the number of Black-capped Petrels in the area.

Following the *Deepwater Horizon* incident in 2010, no Black-capped Petrels were reported as oiled or recovered dead, but decomposition would likely have made positive identification difficult (Haney et al., 2014). 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, 2016). Other indirect impacts would also likely occur after a large oil spill, such as a reduction in suitable foraging habitat and the decline in population of prey species (BirdLife International, 2018).

Overall, a large oil spill could cause significant impacts on Black-capped Petrel populations if there were numerous individuals in the area of the spill. However, due to the low number of individuals thought to frequent the northern Gulf of America, significant impacts on this species from a large spill are considered unlikely.

C.3.9 Rufa Red Knot (Threatened)

The Rufa Red Knot is a small to medium-sized migratory shorebird that transits each year between breeding grounds in Canada to wintering grounds in the southeast U.S., Caribbean, and along the Gulf of America coast (USFWS, 2020). Listed as Threatened under the ESA in 2015, their primary habitat during the winter along the Gulf of America is in the Laguna Madre estuary system in Mexico and Texas.

The primary threats that are faced by Rufa Red Knot include habitat loss, reduced food availability, and alterations of their migratory timing and patterns due to climate and weather conditions (USFWS, 2020). Precise population numbers are difficult to assess, but USFWS estimated in 2023 that the global population was approximately 42,000 individuals (The Wildlife Society, 2023). Critical habitat was proposed by USFWS in 2023 which includes numerous areas along the U.S. Gulf of America coastline.

IPFs that potentially may affect the Rufa Red Knots include support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Installation vessel presence, marine sound, and lights, and effluent discharges are not expected to have a significant impact because this species typically is not found in offshore waters and instead is more coastal in nature. The IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb Rufa Red Knots in offshore waters where they are not common or in nearshore industrial areas near the shorebase. Schwemmer et al. (2011) showed that several marine bird species showed behavioral responses and altered distribution patterns in response to ship traffic, which could potentially cause loss of foraging time and resting habitat. However, it is likely that individuals 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 coastal birds in general are discussed by BOEM (2017). For this DOCD, there are no unique site-specific issues with respect to spill impacts on Rufa Red Knots.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential for impacts on Black-capped Petrels. Appendix G provides details on spill response measures. Given Rufa Red Knots are mostly found in coastal areas and the expected short duration of a small fuel spill, the potential exposure period for Rufa Red Knots would be brief.

A small fuel spill in coastal 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 (NOAA, 2022a). 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.

Rufa Red Knots exposed to fuel 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. It is not expected that a small fuel spill would substantially affect Rufa Red Knot populations.

Impacts of a Large Oil Spill

Potential spill impacts on coastal birds in general are discussed by BOEM (2017). For this DOCD, there are no unique site-specific issues with respect to spill impacts on Rufa Red Knots.

Rufa Red Knots could be exposed to oil from a spill at the project area that travels into coastal area; the number of individuals that could be affected would depend on the extent and persistence of the oil slick and the number of Rufa Red Knots in the area, which is largely seasonally based.

Following the *Deepwater Horizon* incident in 2010, only a single Rufa Red Knot was reported as oiled (USFWS, 2020), but decomposition would likely have made positive identification difficult (Haney et al., 2014). Exposure of marine and coastal 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, 2016). Other indirect impacts would also likely occur after a large oil spill, such as a reduction in suitable foraging habitat and the decline in population of prey species.

Overall, a large oil spill could have significant impacts on Rufa Red Knot populations if there were numerous individuals in the area of the spill or in coastal areas that became oiled.

C.3.10 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). A 5-year ESA review was completed in March 2025, and NOAA concluded that no change to its “threatened” status is warranted (Schultz, 2025). Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude, and historically were one of the most widespread and abundant species of shark (Baum et al., 2015). However, based on reported oceanic whitetip shark catches in several major longline fisheries, the global population appears to have suffered substantial declines (Camhi et al., 2008) and the species is now only occasionally reported in the Gulf of America (Baum et al., 2015).

A comparison of historical shark catch rates in the Gulf of America by Baum and Myers (2004) noted that most recent papers dismissed the oceanic whitetip shark as rare or absent in the Gulf of America. NMFS noted that there has been an 88% decline in abundance of the species in the Gulf of America since the mid-1990s due to commercial fishing pressure (Schultz, 2025).

IPFs that could affect the oceanic whitetip shark include installation vessel presence, sound, and lights, and a large oil spill. Though NMFS (2025a) lists a small diesel fuel spill as an IPF, in the project area, a small diesel fuel spill 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 the project area. Therefore, no significant impacts are expected from small diesel fuel spills and they are not further discussed (Table 2).

Impacts of Installation Vessel and Subsea Equipment Presence, Noise, and Lights

Offshore installation activities produce a broad array of sounds at frequencies and intensities that may be detected by sharks including the Threatened oceanic whitetip shark. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013) which includes sensitivities for individual species to SPLs between approximately 134 to 148 dB re 1 μ Pa in nurse sharks (*Ginglymostoma cirratum*) at frequencies between 100 and 1,000 Hz (Casper and Mann, 2006). These frequencies overlap with sound associated with the DP vessels for the proposed installation activities (SPL source levels of 195 dB re 1 μ Pa m with peak frequencies at 40 to 100 Hz) (Hildebrand, 2005). Impacts from DP vessel activities (i.e., non-impulsive sound) associated with installation operations could include masking or behavioral changes (Popper et al., 2014). The scientific understanding of shark sound production and behavior is in its infancy, as a smooth-hound shark (*Mustelus lenticulatus*) was found to produce sounds, the first evidence of shark sound production in the scientific literature (Nieder et al., 2025).

Behavioral impacts from offshore installation activities are consistent with the results of the assessment in the NMFS Biological Opinions (NMFS, 2020a, 2025a) which indicate that oceanic whitetip sharks may be able to detect DP vessel sound but are not likely to be adversely affected by it due to their lack of a swim bladder. Therefore, because the propagation distances of SPL sufficient to elicit behavioral disturbances from the installation vessel would be limited in geographic scope, 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. A recent study by Cave and Kajiura (2018) reported that when exposed to crude oil, the Atlantic stingray (*Hypanus sabinus*) experienced impaired olfactory function which could lead to decreased fitness. Sharks often rely on olfactory systems in pursuing prey. 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 America, it is unlikely that a large spill would result in population-level effects.

C.3.11 Giant Manta Ray (Threatened)

The giant manta ray (*Mobula birostris*) is a Threatened elasmobranch species that is a slow-growing, migratory, planktivorous species that inhabits tropical, subtropical, and temperate bodies of water worldwide (NOAA, 2018). The giant manta ray became listed as Threatened under the ESA in 2018. A 5-year review of its status was initiated in October 2024 and is still considered ongoing (Schultz, 2025).

Commercial fishing is the primary threat to giant manta rays (NOAA, 2018). The species is targeted and caught as bycatch in several global fisheries throughout its range. Although protected in U.S. waters, protection of populations is difficult as they are highly migratory with sparsely distributed and fragmented populations throughout the world. Some estimated regional population sizes are small (between 100 to 1,500 individuals) (Marshall et al., 2018; NOAA, 2018). Stewart et al. (2018) reported that the Flower Garden Banks serves as nursery habitat for aggregations of juvenile manta rays. At least 74 unique individuals have been positively identified at the Flower Garden Banks based on unique underbelly coloration (Flower Garden Banks National Marine Sanctuary, 2018). Genetic and photographic evidence in the Flower Garden Banks over 25 years of monitoring showed that 95% of identified giant manta ray male individuals were smaller than mature size (Stewart et al., 2018).

IPFs that may impact giant manta rays include installation vessel presence, marine sound, and lights, and a large oil spill. Though NMFS (2025a) lists a small diesel fuel spill as an IPF, in the project area a small diesel fuel spill would be unlikely to affect giant manta rays due to rapid natural dispersion of diesel fuel and the low density of giant manta rays potentially present in the project area. Therefore, no significant impacts are expected from small diesel fuel spills and they are not further discussed (See **Table 2**).

Impacts of Installation Vessel and Subsea Equipment Presence, Marine Sound, and Lights

Offshore installation activities produce a broad array of sounds at frequencies and intensities that may be detected by elasmobranchs including the threatened giant manta ray. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013). Studies indicate sensitivities to SPLs between approximately 139 and 153 dB re 1 μ Pa in yellow stingray (*Urobatis jamaicensis*) and SPLs between approximately 120 and

145 dB re 1 μ Pa in little skate (*Erinacea raja*) at frequencies from 100 to 1,000 Hz (Casper et al., 2003; Casper and Mann, 2006). These frequencies overlap with sound associated with DP vessel activities (SPL source levels of 195 dB re 1 μ Pa m with peak frequencies at 40 to 100 Hz) (Hildebrand, 2005). Impacts from DP vessel activities (i.e., non-impulsive sound) associated with installation operations could include masking or behavioral changes (Popper et al., 2014).

The scientific understanding of skate and ray (Batoidea) is in its infancy. Only recently has evidence been presented for active sound production in skates and rays, and only in three species (Almagro and Barría, 2024; Barroil et al., 2024; Fetterplace et al., 2022). Potential behavioral changes subsequent to offshore installation activities are consistent with the results of the assessment in the NMFS Biological Opinion (NMFS, 2020a, 2025a) which indicate that giant manta rays may be able to detect vessel sound but are not likely to be adversely affected by it due to their lack of a swim bladder. Therefore, because the propagation distances of SPL sufficient to elicit behavioral disturbances from the installation vessel would be limited in geographic scope, no population-level impacts on giant manta rays are expected.

Impacts of a Large Oil Spill

A large oil spill in the project area could reach coral reefs at the Flower Garden Banks which is the only known location of giant manta ray aggregations in the Gulf of America, although individuals may occur anywhere in the Gulf. In the unlikely event of a large oil spill impacting areas with giant manta rays, individual rays could be affected by direct ingestion of oil which could cover their gill filaments or gill rakers, or by ingestion of oiled plankton. Giant manta rays could also experience impaired olfactory function secondary to oil exposure (Cave and Kajiura, 2018). Giant manta rays typically feed in shallow waters of less than 10 m (33 ft) depth (NOAA, 2018). Because of this shallow water feeding behavior, giant manta rays would be more likely to be impacted by floating oil than other species which only reside at depth.

In the event of a large oil spill, due to the distance between the project area and the Flower Garden Banks (approximately 311 statute miles [501 km]), it is unlikely that oil would impact the threatened giant manta ray nursery habitat. It is possible that a large oil spill could contact individual giant manta rays, but due to the low density of individuals thought to occur in the Gulf of America, there would not likely be any population-level impacts.

C.3.12 Gulf Sturgeon (Threatened)

The Gulf sturgeon (*Acipenser oxyrinchus desotoi*) has been listed as a Threatened fish species since 1991 and supported by the most recent 5-year review in 2024 (NOAA, 2022b). Gulf sturgeon inhabit 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 ocean 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, 2022) (**Figure 4**). A species description is presented by BOEM (2012a) and in the recovery plan for this species (USFWS et al., 1995).

Vessel strikes and a large oil spills are the IPFs 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 dissipating (see explanation in **Section A.9.1**). Vessel collisions to Gulf sturgeon would be unlikely based on the location of the support vessel base and NMFS (2025a) estimated one non-lethal Gulf sturgeon collision in the 45 years of proposed action.

Impacts of Support Vessel and Helicopter Traffic

Vessel strikes to Gulf sturgeon would be unlikely based on the location of the shorebase. NMFS (2025) estimated 104 Gulf sturgeon would be killed by vessel strikes over 45 years of proposed action. All vessel strikes from oil and gas vessels are assumed to be lethal to Gulf sturgeon due to vessel and propellor size (NMFS, 2025). Due to the distance of the project area from the nearest Gulf Sturgeon critical habitat (131 statute miles [211 km]) and the shorebase being in Port Fourchon, Louisiana, any impacts from vessel strikes due to project activities will likely be negligible.

Impacts of a Large Oil Spill

Potential spill impacts on Gulf sturgeon are discussed by NMFS (2007) and BOEM (2012a; 2017a). For this DOCD, there are no unique site-specific issues with respect to this species.

The project area is approximately 131 statute miles (211 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 the conditional probability of a spill in the project area contacts any coastal areas containing Gulf sturgeon critical habitat within 60 days of a spill ranges from a maximum of 14% for St. Bernard Parish, Louisiana, 18 to 19% for Baldwin and Mobile, Alabama, and 10% or lower from Escambia, Florida to the southern reach of the critical habitat.

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, subadult and adult Gulf sturgeon would be most vulnerable to an estuarine or marine oil spill, and would be vulnerable from approximately 1 September through 30 April when this species is foraging in estuarine and shallow marine habitats (NMFS, 2025).

C.3.13 Nassau Grouper (Threatened)

The Nassau grouper (*Epinephelus striatus*) received its listing as Threatened in 2016 (NOAA, 2022c), followed by a recovery outline in 2018, and finally a designation of critical habitat in the Florida Keys, Puerto Rico, and the US. Virgin Islands in early 2024 (NOAA, 2024). As long-lived reef fish, the Nassau grouper is typically associated with hard-bottom structures such as natural and artificial reefs, rocks, and underwater ledges. Once one of the most common reef fish species in the coastal waters of the United States and Caribbean (Sadovy, 1997), the Nassau grouper has been subject to overfishing and is considered extirpated in much of its historical range. Observations of current spawning aggregations compared with historical landings data suggest that the Nassau grouper population is substantially smaller than its historical size. The Nassau grouper was listed as Threatened under the ESA in 2016 (81 FR 42268).

Although they are mainly found in the shallow tropical and subtropical waters of eastern Florida, the Florida Keys, Bermuda, the Yucutan Peninsula, and the Caribbean, there has been one confirmed sighting of Nassau grouper from the Flower Garden Banks in the Gulf of America at a water depth of 36 m (118 ft) (Foley et al., 2007). Three additional unconfirmed reports (i.e. lacking photographic evidence) of Nassau grouper have also been documented from mooring buoys and the coral cap region of the West Flower Garden flats (Foley et al., 2007).

There are no IPFs associated with routine project activities that could affect Nassau grouper. A small fuel spill would not affect Nassau grouper because the fuel would float and dissipate on the sea surface and would not be expected to reach the Flower Garden Banks or Florida Keys. A large hydrocarbon spill is the only relevant IPF, although a large oil spill would not be expected to reach grouper habitat due to the distance, and all new pipelines that overlap with grouper habitat would be subject to step-down review (NMFS, 2025a).

Impacts of a Large Oil Spill

Based on the results from the 60-day OSRA model, a large hydrocarbon spill would be unlikely (<0.5% probability) to reach Nassau grouper habitat in the Florida Keys (Monroe County, Florida) (**Figure 4**). A spill would be unlikely to contact the coral habitat of the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 311 statute miles [501 km]), and the difference in water depth between the project area the Banks. While on the surface, hydrocarbons would not be expected to contact subsurface fish.

In the unlikely event that hydrocarbons settled in the water column, and contacted Nassau grouper habitat, hydrocarbon droplets or contaminated sediment particles could come into contact with Nassau grouper present on the reefs. Individual fish could be affected by direct ingestion of hydrocarbons which could cover their gill filaments or gill rakers, result in ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills.

C.3.14 Smalltooth Sawfish (Endangered)

The smalltooth sawfish, named due to their flat, saw-like rostrum, is an elasmobranch ray which lives in shallow coastal tropical seas and estuaries where they feed on fish and invertebrates such as shrimp and crabs. Once found along most of the northern Gulf of America coast from Texas to Florida, their current range in Gulf of America is restricted to areas primarily in southwest Florida (Brame et al., 2019) where several areas of critical habitat have been

designated (**Figure 4**). A species description is presented in the recovery plan for this species (NMFS, 2009b).

Listed as Endangered under the ESA in 2003, population numbers have drastically declined over the past century primarily due to accidental bycatch (Seitz and Poulakis, 2006). Although there are no reliable estimates for smalltooth sawfish population numbers throughout its range (NMFS, 2018c), data from 1989 to 2004 indicated a slight increasing trend in population numbers in Everglades National Park during that time period (Carlson et al., 2007). More recent data resulted in a similar conclusion, with indications that populations were stable or slightly increasing in southwest Florida (Carlson and Osborne, 2012).

There are no IPFs associated with routine project activities that could affect smalltooth sawfish. A small fuel spill would not affect smalltooth sawfish because the fuel would float and dissipate on the sea surface and would not be expected to reach smalltooth sawfish habitat in coastal areas (see **Section A.9.1**). A large oil spill is the only relevant IPF.

Impacts of a Large Oil Spill

The project area is approximately 390 miles (628 km) from the nearest smalltooth sawfish critical habitat in Charlotte County, Florida. Based on the 60-day OSRA modeling (**Table 5**), coastal areas containing smalltooth sawfish critical habitat are unlikely to be affected within 60 days of a spill (<0.5% conditional probability).

Information regarding the direct effects of oil on elasmobranchs, including the smalltooth sawfish are largely unknown. In the event of oil reaching smalltooth sawfish habitats, the smalltooth sawfish could be affected by direct ingestion, ingestion of oiled prey (coastal fishes and invertebrates) or the absorption of dissolved petroleum products through the gills. Based on the shallow, coastal habitats preferred by smalltooth sawfish, individuals in areas subject to coastal oiling could be more likely to be impacted than other species that reside at depth.

C.3.15 Beach Mice (Endangered)

Four subspecies of protected 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. All subspecies are endangered, except for the Choctawhatchee subspecies, which are threatened. Critical habitat has been designated for all four subspecies; **Figure 4** shows the critical habitat combined for all four subspecies. One additional species of beach mouse inhabiting dunes on the western Florida Panhandle, the Santa Rosa beach mouse (*Peromyscus polionotus*), is not listed under the ESA.

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 dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Potential spill impacts on beach mice are discussed by BOEM (2017a; 2023a,b). For this DOCD, 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 140 statute miles (225 km) from the project area. The 60-day OSRA modeling (**Table 5**) predicts that a spill in the project area has up to an 18% 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.3.16 Florida Salt Marsh Vole (Endangered)

The Florida salt marsh vole is a small, dark brown or black rodent found only in saltgrass (*Distichlis spicata*) meadows in the Big Bend region of Florida that was listed as Endangered under the ESA in 1991. Only two populations of Florida salt marsh vole are known to exist: one near Cedar Key in Levy County, Florida and one in the Lower Suwannee NWR in Dixie County, Florida (Florida Fish and Wildlife Conservation Commission, nd). No critical habitat has been established for the Florida salt marsh vole in part due to concerns over illegal trapping or trespassing if the location of the populations were publicly disclosed (USFWS, 2001b).

A large oil spill is the only IPF that potentially may affect the Florida salt marsh vole. There are no IPFs associated with routine project activities that could affect these animals due to the distance from the project area to their habitat and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect the Florida salt marsh vole because a small fuel spill would not be expected to reach their habitat prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Florida salt marsh vole habitat in Levy and Dixie counties, Florida is approximately 331 miles (533 km) from the project area. The 60-day OSRA modeling (**Table 5**) predicts that a spill in the project area has 1% conditional probability of contacting any coastal areas containing beach mouse critical habitat within 60 days of a spill.

In the event of oil contacting beaches containing these animals, Florida salt marsh voles 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. Impacts associated with an extensive oiling of coastal habitat containing Florida salt marsh voles from a large oil spill are expected to be significant. Due to the extremely low population numbers, extensive oiling of Florida salt marsh vole habitat could result in the extinction of the species.

However, any such impacts are unlikely due to the distance from the project area to Florida salt marsh vole habitat and response actions that would occur in the event of a spill.

C.3.17 Panama City Crayfish (Threatened)

The USFWS issued a Final Rule designating the Panama City crayfish as Threatened under the ESA in 2022. The Panama City crayfish is a semi-terrestrial crayfish that grows up to 2 inches (51 mm) in size and is found in south-central Bay County, Florida. Medium to dark brown in color, the crayfish prefers areas dominated by herbaceous vegetation and shallow or fluctuating water levels (Keppner and Keppner, 2004). Historically prevalent in shallow freshwater bodies in pine and prairie communities, urban development has largely replaced these habitats. The Panama City crayfish is now generally found in wet or semi-wet swales, ditches, slash pine plantations, undeveloped utility rights-of-way, and remnant wetlands (Florida Fish and Wildlife Conservation Commission, 2016).

A large oil spill is the only IPF that potentially may affect the Panama City crayfish. There are no IPFs associated with routine project activities that could affect these animals due to the distance from the project area to their habitat and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect the Panama City crayfish because a small fuel spill would not be expected to reach their habitat prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Panama City crayfish critical habitat in Bay County (**Figure 4**), Florida is approximately 213 miles (343 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has up to 1% conditional probability of contacting any coastal areas containing Panama City crayfish critical habitat within 30 days. The 60-day OSRA modeling (**Table 5**) predicts that a spill in the project area has up to 3% conditional probability of contacting any coastal areas containing Panama City crayfish critical habitat within 60 days.

Effects of oiling on the Panama City crayfish are largely unknown. In general, crayfishes use chemoreception to orient themselves in their environment, to find food, and to avoid predators (Bergman and Moore, 2005). Exposure to hydrocarbons has been shown to damage receptor cells that crayfish use for chemoreception, thus decreasing their fitness (Tierney et al., 2010).

Indirect impacts of oiling of Panama City crayfish habitat could include reduction of food supply, destruction of habitat, and fouling of burrows. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. Impacts associated with an extensive oiling of coastal habitat containing Panama City crayfish from a large oil spill are expected to be significant. Due to the low population numbers and restricted range, extensive oiling of Panama City crayfish habitat could be significant at the species level. However, any such impacts are unlikely due to the distance from the project area to Panama City crayfish habitat and response actions that would occur in the event of a spill.

C.3.18 Threatened Coral Species

There are six Threatened coral species (elkhorn coral, staghorn coral, lobed star coral, mountainous star coral, boulder star coral, and rough cactus coral), and one Endangered coral species (pillar coral) known to occur in the northern Gulf of America. Elkhorn coral, lobed star

coral, mountainous star coral, and boulder star coral have been reported from the coral cap region of the Flower Garden Banks (NOAA, 2014), but are unlikely to be present despite their relatively widespread distribution in the northern Gulf of America because they typically inhabit coral reefs in shallow, clear tropical, or subtropical waters. Staghorn coral, pillar coral, and rough cactus coral are only known (in United States waters) from the Florida Keys and Dry Tortugas. 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, Florida Keys, or Dry Tortugas.

NMFS has designated critical habitat in the Florida Keys and Dry Tortugas for the elkhorn and staghorn corals. Critical habitat was also designated for pillar and rough cactus corals in Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island. The designated critical habitat extends to East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank for the lobed star, mountainous star, and boulder star corals (**Table 7**) per 88 FR 54026, effective in September 2023. For the areas in the Gulf of America, this includes the Flower Garden Banks and the waters near Miami-Dade and Monroe counties, Florida, and the Dry Tortugas (**Figure 4**).

There are no IPFs associated with routine project activities that could affect threatened corals in the northern Gulf of America. 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 modeling results from the 60-day OSRA, a large oil spill would be unlikely (<0.5% probability) to reach elkhorn or staghorn coral critical habitats in the Florida Keys (Monroe County, Florida), or coastlines further south (**Figure 4**). 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 311 statute miles [501 km]), and the difference in water depth between the project area (1,700 to 1,925 m [5,577 to 6,315 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 on the seafloor. 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 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 *Deepwater Horizon* 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 America reefs, oil droplets or oiled sediment particles could come into contact with reef organisms or corals. As discussed by BOEM (2017a), 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, 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.3.19 Queen Conch (Threatened)

The queen conch is a large gastropod that occurs throughout the Caribbean Sea, Gulf of America, and Bermuda which was listed as Threatened under the ESA in 2024 (Horn et al., 2022). The species is slow moving and found in a variety of habitats including seagrass beds, sands flats, algal beds, and rubble areas up to 30 m (98.4 ft) in water depth. Larval conch feed primarily on phytoplankton, while juvenile and adults feed on a mix of seagrass and macroalgae (Stoner and Appeldoorn, 2022). Overall, the population of queen conch is declining, largely due to overfishing and illegal fishing practices. Exact population numbers are unknown due to the difficulty in obtaining accurate counts. The majority of available density estimates suggest that conch populations are below minimum thresholds necessary to maintain or increase populations (Horn et al., 2022).

There are no IPFs associated with routine project activities that could affect queen conch. A small fuel spill would not affect queen conch because the fuel would float and dissipate on the sea surface. A large oil spill is the only relevant IPF.

Impacts of a Large Oil Spill

A large oil spill in the project area could potentially reach queen conch habitat and affect the substrate. These effects would be of particular concern where the species occurs in shallower waters. There is some information available on the effects of oil spills on seagrass meadows and other marine gastropods, but little information available on the direct effects of oil on queen conch (Horn et al., 2022). In the event of a large oil spill, due to the low density of individual queen conch thought to occur in the Gulf of America, any population-level impacts are considered unlikely.

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; Davis and Fargion, 1996; Davis et al., 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 America were surveyed from ships during the GulfCet II program (Davis et al., 2000) which reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in deepwater areas of the Gulf of America. 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) (Davis et al., 2000).

Common marine bird 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 marine bird 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, Haney et al. (2014) indicated that marine bird densities over the open ocean were estimated to be 1.6 birds km⁻².

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may also 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 installation vessel 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 Installation Vessel Presence, Marine Sound, and Lights

Birds that frequent offshore oil and gas 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 activities described in this DOCD, any impacts on populations of either seabirds or trans-Gulf migrant birds are not expected to be significant.

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may also 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. A study in the North Sea indicated that

rig lighting causes circling behavior in various birds, especially on cloudy nights; apparently the birds' geomagnetic compass is upset by the red part of the spectrum from the lights currently in use (Van de Laar, 2007; Poot et al., 2008). The numbers varied greatly, from none to some tens of thousands of birds per night per rig, with an apparent effect radius of up to 3 miles (5 km) (Poot et al., 2008). A study in the Gulf of America also noted the phenomenon but did not recommend mitigation (Russell, 2005). One factor to consider in evaluating this impact in the Gulf of America would include the lower incidence of cloudy and foggy days in the Gulf of America versus the North Sea. In laboratory experiments, Poot et al. (2008) found the magnetic compass of migratory birds to be wavelength dependent. Migratory birds require light from the blue-green part of the spectrum for magnetic compass orientation, whereas red light (visible long-wavelength) disrupts their magnetic orientation. They designed a field study to test if and how changing light color influenced migrating birds under field conditions. During field studies they found that nocturnally migrating birds were disoriented and attracted by red and white light (containing visible long-wavelength radiation), whereas they were clearly less disoriented by blue and green light (containing less or no visible long-wavelength radiation) (Poot et al., 2008).

Overall, potential negative impacts to birds from installation vessel lighting, sound, collisions, or other adverse effects are highly localized and may affect individual birds during migration periods.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb pelagic birds in open, offshore waters. Schwemmer et al. (2011) showed that several seabird species showed behavioral responses and altered distribution patterns in response to ship traffic, which could potentially cause loss of foraging time and resting habitat. However, 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). For this DOCD, 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 procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential for impacts on marine birds. DOCD Appendix G provides details 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 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 (NOAA, 2022). 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 at the time of the release.

Marine 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). For this DOCD, 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. Davis et al. (2000) reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted marine birds in the deepwater Gulf of America (>200 m [656.2 ft]). Haney et al. (2014) estimated that seabird densities over the open ocean were approximately 1.6 birds km⁻². The number of marine 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 pelagic birds that may be affected in the event of a large oil spill. Birds that were treated for oiling include several species such as the Northern Gannet, Magnificent Frigatebird, and Masked Booby (USFWS, 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, 2016).

C.4.2 Coastal Birds

Threatened and Endangered bird species (Piping Plover, Whooping Crane, and Rufa Red Knot) have been discussed previously in **Sections C.3.6, C.3.7, and C.3.9**. Various species of non-endangered birds are also found along the northern Gulf Coast, including diving birds, shorebirds, marsh birds, wading birds, and waterfowl. Gulf Coast marshes and beaches also 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 (USFWS, 2010).

The Eastern Brown Pelican (*Pelecanus occidentalis*) was delisted from federal Endangered status in 2009 (USFWS, 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, 2018). 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; Davis and

Fargion, 1996; Davis et al., 2000). Nearly half the southeastern population of Brown Pelicans lives in the northern Gulf Coast, generally nesting on protected islands (USFWS, 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 America. 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 dissipating. Compliance with NTL BSEE-2015-G03 is intended 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; Schwemmer et al., 2011). 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 installation activities, any short-term impacts are not expected to be significant to coastal bird populations.

Helicopter 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 Efromyson et al. (2000). It is assumed that adherence to these guidelines would reduce potential behavioral disturbances (such as temporary displacement or avoidance behavior) of individual birds in coastal and inshore areas. Potential

impacts from helicopter traffic are not expected to be significant to bird populations or species in the project area.

Impacts of Large Oil Spill

The 30-day OSRA results summarized in **Table 4** estimate that shorelines contact with Lafourche and Plaquemines parishes could be contacted within 10 days (1% to 5% respectively), and other Louisiana and Florida shorelines could be contacted within 30 days (1% to 11% conditional probability). The 60-day OSRA modeling (**Table 5**) predicts that shorelines between Matagorda, Texas, and Levy, Florida have up to a 1 to 37% conditional 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 (USFWS, 2010). Oil interferes with the water repellency of feathers and can cause hypothermia in the right 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 these species is generally limited to these waters and surrounding coastal habitats. Brown Pelicans feed on mid-sized fish that they capture by diving from above (“plunge diving”) and then scooping the fish into their expandable gular pouch, while White Pelicans feed from the surface by dipping their beaks in the water. These behaviors make pelicans 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 America. 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 America (Biggs and Ressler, 2000).

Most fishes inhabiting shelf or oceanic waters of the Gulf of America have planktonic eggs and larvae (Ditty, 1986; Ditty et al., 1988; Richards et al., 1989; Richards et al., 1993). Recent ichthyological work has been shedding light on the mobility of ichthyological larvae: for example, work from Shiroza et al. (2021) has demonstrated that bluefin tuna larvae (*Thunnus thynnus*), even <10 mm standard length, have mobility substantial enough that they are able to actively pursue prey. Scientific understanding of larval mobility could potentially change impact assessments, as larvae may be more capable at avoiding certain impacts than previously expected. However, larval mobility is still being understood across fish species, including other fishes that occur in this area.

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 America substantiated high species richness but general domination by relatively few families and species. This was confirmed by Wang et al. (2021), who found that in a survey of the northern Gulf of America the larval assemblage was dominated by just three deep-sea finfish families.

IPFs that potentially may affect pelagic communities and ichthyoplankton include installation vessel 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 Installation Vessel Presence, Marine Sound, and Lights

Installation vessel presence, as a floating structure in the deepwater environment, will act as fish aggregating devices (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 America 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. Elevated 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 μ Pa accumulated over a 48-hour period for onset of recoverable injury and 158 dB re 1 μ Pa 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). Fish aggregating is likely to occur to some degree due to the presence of the vessel, but the impacts would be limited in geographic scope and no population-level impacts are expected.

Limited 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 $\mu\text{Pa}^2\cdot\text{s}$ but resulted in no increased mortality between the exposure and control groups. Non-impulsive noise sources are expected to be far less injurious than impulsive noise. Based on transmission loss calculations (Urick, 1983), open water propagation of noise produced by typical sources with DP thrusters in use, are not expected to produce received levels greater than 160dB re 1 μPa beyond 25 m from the source. Because of the periodic and transient nature of ichthyoplankton (many larval fish are known to undertake diel migrations), they are not expected to remain within the ensonified area for a full 24-hour period to realize $\text{SEL}_{24\text{h}}$ necessary to result in injury, and no impacts to these life stages are expected.

Impacts of Effluent Discharges

Contaminants released into the water column will be diluted rapidly within the open ocean environment. 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 water quality, plankton, and nekton 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 water quality, plankton, and nekton 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 installation vessel. 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, including young fish with limited mobility, 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 installation activities impacts of entrainment are not expected to be significant to plankton or ichthyoplankton populations (BOEM, 2017a). The installation vessel 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). For this DOCD, 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 procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to mitigate the potential for impacts on pelagic communities, including ichthyoplankton. DOCD Appendix G provides details 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 of the release and on 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 dissipated naturally within 24 hours (NOAA, 2022). 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 phytoplankton, zooplankton, and nekton. Due to the limited areal extent and short duration of water quality impacts, a small fuel spill would be unlikely to produce detectable impacts on pelagic communities and ichthyoplankton.

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 biota 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. 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 present on the water surface. 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 Council (GC) 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 (GC, 2005). The EFH for most of these GC-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 59 statute miles (94 km) from 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 America. Species in this group, including tunas, swordfishes, billfishes, and sharks, are managed by NMFS (2017). **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 778, including life stage(s) potentially present within the project area (National Marine Fisheries Service [NMFS], 2017).

Common Name	Scientific Name	Life Stage(s) Potentially Present Within or Near the Project Area
Atlantic bluefin tuna	<i>Thunnus thynnus</i>	All
Bigeye tuna	<i>Thunnus obesus</i>	Juveniles, adults
Bigeye thresher shark	<i>Alopias superciliosus</i>	All
Blue marlin	<i>Makaira nigricans</i>	All
Dusky shark	<i>Carcharhinus obscurus</i>	Juveniles, adults
Longbill spearfish	<i>Tetrapturus pfluegeri</i>	All
Longfin mako shark	<i>Isurus paucus</i>	All
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	All
Sailfish	<i>Istiophorus platypterus</i>	Spawning, eggs, larvae, adults
Scalloped hammerhead shark	<i>Sphyrna lewini</i>	Juveniles, adults
Shortfin mako shark	<i>Isurus oxyrinchus</i>	All
Silky shark	<i>Carcharhinus falciformis</i>	All
Skipjack tuna	<i>Katsuwonus pelamis</i>	All
Swordfish	<i>Xiphias gladius</i>	All
Tiger shark	<i>Galeocerdo cuvier</i>	Juveniles, adults
Whale shark	<i>Rhincodon typus</i>	All
White marlin	<i>Tetrapturus albidus</i>	Juveniles, adults
Yellowfin tuna	<i>Thunnus albacares</i>	All

Research indicates the central and western Gulf of America may be important spawning habitat for Atlantic bluefin tuna (*Thunnus thynnus*), and (NMFS, 2017) has designated a Habitat Area of Particular Concern (HAPC) for this species. The HAPC covers much of the deepwater Gulf of America, including the project area (**Figure 4**). The areal extent of the HAPC is approximately 300,000 km² (115,831 mi²). 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 America to spawn in April, May, and June. However recent studies found that some adults of spawning size remained in the Mid-Atlantic bight instead (NMFS, 2017). 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 (GC, 2005). One of the most significant changes 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 EEZ. A 2009 amendment to the Highly Migratory Species Fisheries Management Plan updated the EFH and HAPC to include the bluefin tuna spawning area (NMFS, 2009c). Amendment 10 made further updates to the EFH boundaries, HAPCs, and life history information based on new scientific data (NMFS, 2017). New HAPCs for lemon and sand tiger sharks were designated while modifications were made for bluefin tuna and sandbar sharks (NMFS, 2017).

NLTs 2009-G39 and 2009-G40 provide guidance and clarification of the regulations (i.e., 50 CFR 600 Subpart J) 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 America Region and NOAA's Southeastern Region during the preparation, distribution, and review of BOEM's 2024-2029 National OCS oil and gas leasing program Final Programmatic EIS (BOEM, 2023a).

Other HAPCs have been identified by the GC (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 America. The HAPC located nearest to the project area (approximately 40 statute miles [64 km]) Mississippi Canyon 118.

IPFs that potentially may affect EFH include installation vessel 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 Installation Vessel Presence, Marine Sound, and Lights

The installation vessel, as a floating structure in the deepwater environment, will act as a 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.

Installation 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; Brintjes and Radford, 2013; McLaughlin and Kunc, 2015). 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 μ Pa accumulated over a 48-hour period for onset of recoverable injury and 158 dB re 1 μ Pa accumulated over a 12-hour period for onset temporary auditory threshold shifts. No reliable behavioral thresholds for fish have been established. Because the installation vessel is a temporary structure, any impacts on EFH for managed species are considered negligible.

Impacts of Effluent Discharges

Other effluent discharges affecting EFH by diminishing ambient water quality include 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 detectable impacts on EFH for managed species 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 installation activities, any short-term impacts on EFH for highly migratory pelagic fishes are not expected to be biologically significant. The multisale 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 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 DOCD, 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 procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to help diminish the potential for impacts on EFH. DOCD 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 of the release 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 dissipated naturally within 24 hours (NOAA, 2022). 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 also produce short-term impact on water quality in the HAPC for spawning bluefin tuna, which covers much of the deepwater Gulf of America. The areal extent of the affected area would represent a negligible portion of the HAPC.

A small fuel spill would likely not affect EFH for corals and coral reefs, the nearest EFH being the topographic features located approximately 59 statute miles (95 km) from 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; 2023). For this DOCD, 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 America (GC, 2005; NMFS, 2017), 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, 2017). 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 America to spawn in April, May, and June (NMFS, 2017).

The topographic features located 59 statute miles (95 km) from the project area are designated as EFH under the corals and coral reefs management plan (GC, 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

The project area is on the list of archaeology survey blocks with a high potential for historic shipwrecks (BOEM, 2011). The archaeological assessment identified no archaeologically significant artifacts or shipwrecks within 457 m (1,500 ft) of the proposed sites based on an autonomous underwater vehicle survey (bp, 2001). All the applicable requirements of NTL 2005-G07 and 30 CFR 550.194(c) will be followed by bp and its contractors, 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 457 m (1,500 ft) of the proposed site, 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 2017-2022 Lease Sale EIS (BOEM, 2017a) 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 site, this impact 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 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. All operations within 305 m (1,000 ft) of the site would be ceased until the Regional Supervisor provides instructions on steps to take to assess the site's potential historic significance and protect it.

Beyond this radius, there is the potential for impacts from oil, dispersants, and depleted oxygen levels. These impacts could include chemical contamination, alteration of the rates of microbial activity (BOEM, 2017a), and reduced biodiversity at shipwreck-associated sediment microbiomes (Hamdan et al., 2018). 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 or known coastal shipwreck sites. BOEM (2012a) stated that if an oil spill contacted a coastal historic site, such as a fort or a lighthouse, the major impact would be a visual impact from oil contact and contamination of the site and its environment.

C.6.2 Prehistoric Archaeological Sites

With the water depth at the location of the proposed boosting station being approximately 6,037 ft (1,840 m) (bp, 2001), which are 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 America. 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). The 30-day OSRA results summarized in **Table 4** estimate that shorelines of Plaquemines and Lafourche parishes could be contacted within 10 days (1% to 5% conditional probability), 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, Texas, and Levy County, Florida, could have contact within 60 days of a spill with the conditional probabilities highest along the Alabama and Louisiana coastlines.

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 America that may be affected by oil and gas activities are described by BOEM (2017a). 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 onshore 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 for coastal habitats and protected areas. 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 dissipating. 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 DOCD Section 13, 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).

Impacts of a Large Oil Spill

Potential spill impacts on coastal habitats are discussed by BOEM (2017a). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs and submerged seagrass beds. For this DOCD, there are no unique site-specific issues with respect to coastal habitats.

The 30-day OSRA results summarized in **Table 4** estimate that shorelines of Plaquemines and Lafourche parishes could be contacted within 10 days (1% to 5% conditional probability), 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, Texas, and Levy County, Florida, could have contact within 60 days of a spill with the conditional probabilities highest along the Alabama and Louisiana coastlines.

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) and bp's ROSRP. 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).

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 OSRA 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

Table 9. (Continued).

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National 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). 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 are expected to 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).

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). The main commercial fishing activity in deep waters of the northern Gulf of America is pelagic longlining for tunas, swordfishes, and other billfishes (Continental Shelf Associates, 2002; Beerkircher et al., 2009). 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 America 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) (Stiles et al., 2007). 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; Keithly and Roberts, 2017). 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 IPFs associated with routine operations that potentially may affect fisheries are installation vessel presence and 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 Installation Vessel Presence, Marine Sound, and Lights

There is a slight possibility of pelagic longlines becoming entangled in the installation vessel. 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 America (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.

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 ROSRP is expected to potentially mitigate and reduce the potential for impacts. DOCD 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 dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Potential spill impacts on fishing activities are discussed by BOEM (2017a; 2023b). For this DOCD, 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 America 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 America (NMFS, 2021). At its peak on 12 July 2010, closures encompassed 217,821 km² (84,101 mi²), or 34.8% of the U.S. Gulf of America EEZ.

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 also 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 naturally 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 subsea equipment installation activities 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). For the EIA, 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 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 installation or support vessels 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;2023). For this DOCD, 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 results summarized in **Table 4** estimate that shorelines of Plaquemines and Lafourche parishes could be contacted within 10 days (1% to 5% conditional probability), 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, Texas, and

Levy County, Florida, could have contact within 60 days of a spill with the conditional probabilities highest along the Alabama and Louisiana coastlines.

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). 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 should 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 expected effects 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.

C.8.6 Other Marine Uses

The project area is not located within any USCG-designated fairway or shipping lane or Military Warning Area. Compliance with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft will be followed by bp. The site clearance letters for the proposed sites identified existing seafloor infrastructure in the vicinity of the proposed sites but no impacts on existing infrastructure are expected. The archaeological survey reported no archaeologically significant sonar contacts were identified within 457 m (1,500 ft) of the proposed site (bp, 2001).

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 or shipping lane. In the event of a large spill requiring numerous response vessels, coordination would be required to manage the vessel traffic for safe operations. Compliance with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft, will be met by bp.

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 (BOEM, 2017a). The level and types of activities planned in bp’s DOCD are within the range of activities described and evaluated by BOEM in the Final Multisale EIS (BOEM, 2017a), 2017 to 2022 Programmatic Environmental Impact Statement for the Outer Continental Shelf (OCS) Oil and Gas Leasing Program (BOEM, 2023a), and the Final Programmatic EIS for Gulf of America Regional OCS Oil and Gas Lease Sales and Post-Lease Activities (BOEM, 2025b). 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; 2023a,b; 2025).

Description of Activities Reasonably Expected to Occur in the Vicinity of Project Area. Other exploration and development activities are not expected 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; 2023a,b).

Cumulative Impacts of Activities in this DOCD. The BOEM Final EISs (2017a; 2023a,b) included a discussion of cumulative impacts, which analyzed the incremental environmental and socioeconomic impacts 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 America.

The level and type of activity proposed in bp's DOCD 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 DOCD, in conjunction with the other reasonably foreseeable activities expected to occur in the Gulf of America. For all impacts, the incremental contribution of bp's proposed actions to the cumulative impacts analysis in these prior analyses are not expected to be significant.

D. Environmental Hazards

D.1 Geologic Hazards

The shallow hazards assessments did not identify geologic hazards at the location of the proposed project activities (bp, 2001). See DOCD 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 installation vessel 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 installation vessel for safety reasons until the storm or weather event passes. There are 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 contractors' site-specific EEP, the site-specific hurricane preparation checklist and the Gulf of America Region Severe Weather Contingency Plan would be adhered to.

D.3 Currents and Waves

Metoccean 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 installation vessel selected for this project. High waves during a severe storm could disrupt support activities (i.e., vessel and helicopter traffic), and risks to the 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 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 project activities and the selection of a potential installation vessel, 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 locations, trajectories, construction designs, and strategies, amongst other variables.

F. Mitigation Measures

The proposed program includes numerous processes and actions that are intended to mitigate potential impact on the environment. The project is expected to comply with applicable federal, state, and local requirements concerning air pollutant emissions, discharges to water, and waste management. In addition, bp and its contractors 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 safety issues as well as potential pollution 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 installation vessel 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.
- Preventative maintenance of vessel 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 America Waste Management procedures and/or the contractor's established waste management procedures. Wastes are expected to be 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 hydrocarbon-based fluid hoses to ensure isolation of any hose failures.
- On site spill kits are inspected regularly and re-stocked as needed.
- Drills are conducted regularly, often engaging the IMT onshore to test the effectiveness and quality of processes deployed to address oil spill scenarios.

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:

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