UNITED STATES GOVERNMENT MEMORANDUM

April 22, 2024

To: Public Information (MS 5030)

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

Subject: Public Information copy of plan

Control #	-	S-08147
Type	-	Supplemental Development Operations Coordinations Document
Lease(s)	-	OCS-G15607 Block - 743 Green Canyon Area
Operator	-	BP Exploration & Production Inc.
Description	-	DC104PRI, DC104CON
Rig Type	-	Not Found

Attached is a copy of the subject plan.

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

Nawaz Khasraw
Plan Coordinator

Site Type/Name	**Botm Lse/Area/Blk**	**Surface Location**	**Surf Lse/Area/Blk**
WELL/DC104CON	G15607/GC/743	6040 FSL, 7052 FWL	G15607/GC/743
WELL/DC104PRI	G15607/GC/743	6058 FSL, 7076 FWL	G15607/GC/743

GulfofMexico

BP Exploration & Production Inc.

Gulf of Mexico

Supplemental

Development Operations Coordination Document

Atlantis Development

Green Canyon Blocks:
GC699, OCSG 15604
GC742, OCSG 15606
GC743, OCSG 15607
GC744, OCSG 15608
GC743 Unit, Agreement No. 754305003

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AMENDMENT RECORD

Amendment Date	Revision Number	Amender Initials	Amendment

Table of Contents

1 Plan Contents

1.1 History of Unit Leases

BP Exploration & Production Inc. (BP) received approval for the Atlantis Project's Initial Development Operations Coordination Document (DOCD) (N-7646) in 2003. Subsequent Revised and Supplemental DOCDs have been submitted to address various project revisions and expansion activities. The DOCD has recently been updated by approved submissions S-7944, R-6976 and S-8058. A list of DOCD Plan Control Numbers associated with the Atlantis Unit activities is in Section 16. The Atlantis GC743, Unit, Agreement No.754305003 currently includes GC699, OCSG 15604; GC742, OCSG 15606; GC743, OCSG 15607; and GC744, OCSG 15608. Block GC700, OCSG15605 contracted out of the Green Canyon Block 743 Unit effective October 6, 2013, as required by the Unit Agreement. Lease GC700, OCSG 15605 expired on October 6, 2014.

The previously approved Initial, Revised, and Supplemental DOCDs describe 20 wells in Drill Center No. 1 (DC1), 2 wells in Drill Center No. 8 (DC8), 9 wells in Drill Center No. 3 (DC3), 8 wells in Drill Center No. 2 (DC2), the associated subsea pipeline architecture to transport production from the individual wells in the drill centers to the GC787 A Platform, RUE 23579, and the processing, measurement and allocation of production for royalty and sales on the platform prior to final delivery to export pipelines for transportation to shore facilities.

The current status of previously approved wells may be found in Wells Status Chart Section 16.

1.2 Description of Activities

This Supplemental DOCD describes the addition of a new well DC104 and a contingency location. DC104 is a proposed dual zone water injection well to improve pressure support, sweep, and provide stability in the SW for M57 and M55, and due to inter-reservoir connectivity may also provide indirect support to the M54 reservoir. The well will tie-into an existing PLET at Drill Center 1 (DC1) with a new subsea tree, well jumper(s), flying leads and associated controls.

Appendix A contains revised BOEM-0137 forms showing the location information and tentative schedules to drill the primary well and a contingency if needed, complete the well and install the proposed lease-term pipeline(s).

BP will not be utilizing pile-driving in this plan.

This Supplemental DOCD updates the activities and estimates of the emissions of an air pollutant due to potential increase from the amount specified in our AQR submitted with the previously submitted Revised DOCD R-7293.

Additional Measures described in Appendices A, B, C and J of the NMFS Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico, 2020, revised 2021 will be implemented, to the extent they are applicable to the activities described in this document.

1.3 Location

Maps showing required location features and location plats for GC743, DC104 and DC104 contingency have been included in the Appendix B to show the updated information for the revised well location and approximate routes of the lease-term pipeline structures.

1.4 Storage Tanks and Production Vessels

Storage Tanks for Drillship

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Number of Tanks	Total Capacity (bbls)	Fluid Gravity (API)
#1 Fuel Oil	Drillship	11,993	2	23,986	33
#2 Fuel Oil	Drillship	6,438	2	12,876	33
DO Service Tank	Drillship	476	2	952	33
Lube Oil	Drillship	328	1	328	35
Lube Oil	Drillship	275	3	825	35

Storage Tank DP for Semisubmersible (SS)

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

Storage Tanks for Support Vessels

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Number of Tanks	Total Capacity (bbls)	Fluid Gravity (API)
Fuel Oil	Supply Boat (Typical 280-feet)	450	16	7,200 bbls Depending on cargo carried	31.14

1.5 Pollution Prevention Measures

Safety and pollution prevention features utilized during drilling operations will include the use of appropriately designed casing and cement programs; appropriate blowout preventers, diverters, and other associated well equipment, appropriate mud monitoring equipment and sufficient mud volumes for well control; and properly trained personnel as described in 30 CFR Part 250, Subparts C, D, E, F and O, 30 CFR Part 550, Subparts B and C, and as further described in Notices to Lessees (NTLs).

Appropriate fire drills and abandon ship drills will be conducted, and navigational aids, lifesaving equipment, and all other shipboard safety equipment will be installed and maintained as mandated by the U.S. Coast Guard regulations contained in 33 CFR Part 144.

These operations do not propose activities for which the State of Florida is an affected state.

1.6 Additional Measures

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

2 General Information

2.1 Applications and Permits

The following table lists standard applications that will be submitted to remove existing subsea tree, drill, and complete the revised well, install new subsea tree decommission lease-term pipelines install a new lease-term pipeline, and begin production.

Application / Permit	Issuing Agency	Status
Supplemental DWOP - New Technology	BSEE / BOEM	Pending Submittal
Pipeline Lease Term Application	BSEE / BOEM	Pending Submittal
Application for Permit to Drill (APD)	BSEE / BOEM	Pending Submittal
Enhanced Oil and Gas Recovery Revision	BSEE / BOEM	Pending Submittal
Supplemental CID	BSEE / BOEM	Pending Submittal
Atlantis RUE Amendment – Well and Subsea Infrastructure	BSEE / BOEM	Pending Submittal
District PSS Modification – Topside modifications	BSEE	Pending Submittal
NPDES Permit GMG-290110	EPA R6	Existing

2.2 Drilling Fluids

The following table shows information on the types and amounts of the drilling fluids that are planned to be used to drill the proposed wells.

Type of Drilling Fluid	Estimated Volume of Drilling Fluid to be Used per Well
Water-based (seawater, freshwater, barite)	65,000-bbls
Synthetic-based (internal olefin, ester)	16,800-bbls

2.3 Anticipated Production

The following table shows information for production uplift rates based on the field's existing profile data.

Anticipated Production Rate Uplift

Type	Average Injector Production Rate Uplift	Peak Injector Production Rate Uplift	Life Of Reservoir
Oil	815-bbls/day	7041-bbls/day	20-years
Gas	0.4-mmcfd	5-mmcfd	20-years

2.4 Oil Characteristics and Composition

The following are characteristics of the oil composition most likely to result in the largest volume spill (e.g., the oil from the expected largest reservoir, stored oil or pipeline oil combined from a number of wells).

Oil Characteristics

Characteristic	Value	Analytical Methodologies Should be Compatible With:
(1) Gravity (API)	30 Degrees API	ASTM D5002
(2) Flash Point (C)	13.9 (reported previously for M54 PVT Sample taken from GC743, Well API No. 60-811-40349-02)	ASTM D93 Flash Point
(3) Pour Point (C)	<0	ASTM D97
(4) Viscosity (Centipose at 70° F)	19.45	ASTM D 445-01
(5) Wax Content (wt%)	4.7%	UOP 46 Modified
(6) Asphaltene Content (wt%)	7.4 %	ASTM D 4055 modified
(7) Resin Content (wt%)	10.9	Estimation
Benzene	0.076 wt%	
Toluene	0.278 wt%	
Ethyl Benzene	0.186 wt%	
Xylene	0.561 wt%	m&p-Xylene plus o-Xylene
Saturates	46.97 wt%	
Aromatics	34.95 wt%	
Polars/Resins	10.90 wt%	
Asphaltene	7.18 wt%	
(8) Sulphur (wt%)	1.5%	ASTM D 4294

Component	Mole %	Component	Mole %	Component	Mole %	Component	Mole %
N_2	0.306	C10	3.258	C24	0.560	C38	0.170
CO_2	0.202	C11	2.421	C25	0.499	C39	0.170
H_2S	0.000	C12	2.038	C26	0.451	C40	0.152
C1	28.562	C13	1.904	C27	0.447	C41	0.139
C2	7.289	C14	1.665	C28	0.397	C42	0.126
C3	6.948	C15	1.498	C29	0.388	C43	0.118
iC4	1.219	C16	2.655	C30	0.372	C44	0.108
nC4	3.974	C17	1.205	C31	0.312	C45	0.110
iC5	1.640	C18	1.746	C32	0.294	C46	0.095
nC5	2.364	C19	1.010	C33	0.250	C47	0.096
C6	3.336	C20	0.925	C34	0.236	C48	0.083
C7	4.081	C21	0.727	C35	0.221	C49	0.078
C8	4.582	C22	0.675	C36	0.206	C50+	3.410
C9	3.482	C23	0.604	C37	0.194		
						C50+ Mole Wt	881.87
						C50+ Sp Gr	1.071

The data shown in Section 2.4 Table was based on an analysis of the oil sample taken from the following well:

Table 1 Sample Well

Sample Well	
Area / Block	GC743
Platform ID	GC787 A
API Well No.	608114041200
Completion Perforation Interval	17,874 Ft. MD Sample
Reservoir Name	M53
Sample Date	July 28, 2004
Sample No’s (if more than one is taken) (wt%)	Single Sample Only

2.5 New or Unusual Technologies

Drilling activities in Green Canyon Block 743 are evaluating the applicability of Managed Pressure Drilling (MPD) technology to mitigate non-productive events associated with pore pressure / fracture gradient (PPFG) uncertainty. An MPD overview is included in **Appendix J** of this DOCD.

Subsea Installation activities in Green Canyon Block 743 plan to install One (1) Flexible Well Jumper for the tie-in of DC104. The flexible well jumper is made of thermoplastic composite pipe, with gooseneck connectors at the end. Thermoplastic composite pipe is a new flexible technology with details contained in DC104 New Technology DWOP application associated DC104 Lease Term Pipeline Application.

2.6 Bonding Information

The bonding requirements for the activities proposed in this supplemental DOCD are satisfied by an area-wide bond, furnished, and maintained according to 30 CFR 556, Subpart I; NTL No. 2000-G16, "Guidelines for General Lease Surety Bonds"; and additional security under 30 CFR 556.53(d) and NTL 2008-N07, "Supplemental Bond Procedures".

2.7 Oil Spill Financial Responsibility

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

2.8 Deepwater Well Control

BP Exploration & Production Inc. (Operator No. 02481) has the financial capability to drill a relief well and conduct other emergency well control operations. According to NTL 2008-G04, this Section of the Plan is not applicable to the proposed operations.

2.9 Suspension of Production

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

2.10 Blowout Scenario

2.10.1 Blowout Scenario

The worst-case discharge of the one proposed well in this plan based on analysis is not expected to exceed the worst-case discharge of the Blowout Scenario that was described in the Supplemental DOCD S-7530, approved on July 13th, 2012.

The blowout scenario for SDOCD S-7530 is for a potential blowout of the GC-699, DC312 development well, which bp expects will have the highest volume of liquid hydrocarbons in the Atlantis 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. Day 1, worst case discharge is approximately 179,400 bpd, shown with the calculation support package submitted with SDOCD S-

7530. The maximum duration of the blowout is estimated at 120-days (see relief well timing below). The rate profile associated with the well blowout over this 120-day period (also included in the attachment) results in a potential worst case spill volume estimated at 18.8-mmbo.

2.10.2 The Potential for the Well to Bridge Over

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

2.10.3 The Likelihood for Surface Intervention to Stop the Blowout

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

2.10.4 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 DOCD; there is no existing drilling infrastructure in the vicinity of the proposed bottom hole locations.

Rig Name	Current Location	Current Operator	Contract Expire Date	Rated WD (feet)	Rated TD (feet)	Rated BOPs (psi)	Moor Type	Relevant Drill Package Limitations
Stena IceMax	GOM	bp	2023	10K	37.5K	15K	DP	None identified at this time
Diamond Ocean BlackLion	GOM	bp	2022	10K	40K	15K	DP	None identified at this time
Diamond Ocean BlackHornet	GOM	bp	2023	10K	40K	15K	DP	None identified at this time

The estimated time to drill a relief well is: 10 days to mobilize and spud, 75 days from spud to casing shoe above WCD zone, plus 35 days for ranging, intersection, and kill operation for a total of 120 days.

2.10.5 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), current NTLs, and in particular, the Interim Final Rule focused on BOP certification and reliability. Additional measures:

1. Volume measurements relative to the well will be monitored at all times during all operations;

2. Flow checks before leaving bottom, after pulling into shoe, and before BHA enters stack.
3. bp representative will observe well conditions prior to each trip and after well kills or testing;
4. bp representative will be the only person authorized to initiate opening the well as part or conclusion of well control measures;
5. On rig JSA/contingency plan before running any non-shearable tools or pipe through the BOP stack; and
6. BP has a 24/7 monitoring center, Wells Remote Collaboration Center, Wells 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; and additionally, bp has adopted the following performance standards:
    a. BP will use and will require its contractors involved in drilling operations to use, subsea blowout preventers (BOPs) equipped with no fewer than two blind shear rams and a casing shear ram on all drilling rigs under contract to bp for deepwater service operating in dynamic position mode. With respect to moored drilling rigs under contract to BP for deepwater drilling service using subsea BOPs, the subsea BOP will be equipped with two shear rams, which will include at least one blind shear ram and either an additional blind shear ram or a casing shear ram.
    b. 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 is performed in accordance with manufacturer recommendations and API Std 53.

2.10.6 Measures that would Reduce the Likelihood of a Blowout

Measures to reduce the likelihood of a blowout include compliance with applicable regulations (30 CFR 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;
2. Management of change process will be followed for all procedure changes; and
3. A Well Control Response Guide will be in place.
4. With the integration of the Wells RCC, bp has staff monitoring well(s) 24/7. Having a monitoring center away from the rig in a controlled environment gives bp the opportunity to evaluate data real time and communicate issues to the Wells Superintendent, Wells Engineer, as well as the rig.

2.10.7 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;
2. Wellhead equipment and sufficient casing is identified and available for a relief well;
3. A rig(s) is identified and available for a relief well;
4. A Well Control Response Guide is in place; and
5. Incident Management System (IMS) is in place. The bp IMS is comprised of government-approved plans which cover various scenarios; Incident Management Teams are trained

annually in the Incident Command System, which is a part of the National Incident Management System; BP has access to response capability through various contractors and technical specialists; and pre-designated facilities, where the teams can provide adequate oversight to the response.

2.10.8 Other Measures

Oil spill response-related activities for the well to be drilled under 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 10 April 2023. The ROSRP was filed 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 30 May 2023. 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. Any spill from the vessel(s) conducting the activities covered by this DOCD would also be addressed by the vessel operator in accordance with the response plan of the vessel(s) from which the spill emanated.

2.10.9 Worst Case Discharge Model Report

A Worst-Case Discharge Modeling Report was included in **Appendix C** of Supplemental DOCD S-7530. The Discharge Modeling Report provided assumptions related to the blowout scenario for Atlantis GC699, DC312 and the Thunderhorse MC778, Well No.15. Geological and Geophysical Information (30 CFR 550.244)

BP has conducted an analysis of the well(s) proposed in this SDOCD and has concluded that the worst-case discharge scenario associated with the wells does not exceed the worst-case discharge scenario described in supplemental DOCD, S-7530.

Because the worst-case discharge scenario described in supplemental DOCD S-7530 does not exceed the worst-case discharge scenario covered by BP's current approved OSRP, the well(s) proposed in this SDOCD also do not supersede the worst-case scenario in BP's GoM Regional OSRP approved by BSEE on November 29, 2022.

3 Geological and Geophysical Information

3.1 Geological Description

Geological objectives are infill targets in the southwest area of Atlantis. The targeted zones include current producing M57, M55, and M54 reservoirs. DC104 is expected to be completed in two zones - the M57 and M55 reservoirs. However, this will depend on drilling results at the time of operations and whether we have the flexibility to switch to the M54 in the event of potentially faulting out the M55. We will be requesting injection permits for all three zones - M57, M55 and M54 reservoirs - due to inter-reservoir connectivity that we see across the field. Hence the reservoir structure maps for all three reservoir intervals have been included in Appendix C.

The field is located in the Southern Green Canyon protraction area within the Western Atwater (or Mississippi Fan) Foldbelt, deepwater GOM. It is one of a series of Miocene-Pliocene, NE-SW trending anticlines. The Atlantis structural core is an autochthonous salt body, which is also the southernmost limit of salt extent. The steep-sided, box-fold structure is truncated by Plio-

Pleistocene Unconformities. The southern flank is overlain by a thick accumulation of rapidly deposited, gently dipping Pleistocene sediments. The north flank and crest are overlain by a thick body of allochthonous salt and by a covering of Pleistocene sediments. The salt wedge causes topographic relief of the Sigsbee Escarpment.

The Atlantis structure is an elongated anticline with an overall 4-way dip closure from the top of the Miocene down to the top of the autochthonous salt. The 4-way dip closure is compartmentalized by faults, which trend parallel, perpendicular, and radial to the long axis of the structure. These compartments include a variety of dip- and fault-bounded closures. Reservoir top seals are provided by Middle Miocene shales. The allochthonous salt canopy in the overburden covers the northern portion of the field. The geometric complexity of the overburden creates significant imaging challenges over the northern half of the field. The interpreted fault framework and structure mapping comes from careful integration of seismic data, well log correlations, and image log data.

Updates for the currently planned position and trajectory are shown on the structure maps, seismic, and geologic cross-sections included in Appendix C in the "Proprietary Information" of this Supplemental DOCD.

Updates for the currently planned position and trajectory are shown on the structure maps, seismic, and geologic cross-sections included in **Appendix C**.

3.2 Structure Contour Maps

Current structure contour maps at a scale of 1-inch = 2,000-feet (depth-based, expressed in feet subsea) drawn on the top of each prospective hydrocarbon sand, showing the lease block and the location of each proposed well are included in **Appendix C**: Geologic Structure Maps, Interpreted Seismic Lines, Geologic Cross-sections. Locations of geologic cross sections are also shown in **Appendix C**. All proposed well plans shown on maps are notional, pending detailed well planning over the coming months.

3.3 Interpreted 2D and/or 3D Seismic Lines

Page-size copies of migrated and annotated (shot points, time lines, well paths) 3-D seismic lines within 500-feet of the surface locations of the proposed wells are included in **Appendix C**: Geologic Structure Maps, Interpreted Seismic Lines, Geologic Cross-sections. All proposed well plans shown on seismic lines and cross sections are notional, pending detailed well planning over the coming months.

3.4 Geological Structure Cross-Sections

Interpreted geological structure cross-sections showing the location and depth of each proposed well specific to DC1 locations is included in **Appendix C**: Geologic Structure Maps, Interpreted Seismic Lines, Geologic Cross-sections.

3.5 Shallow Hazards Report

A shallow hazards and archeological report were submitted in separate binders with plan S-7530. A list of the Shallow Hazards and archeological reports and shallow hazards assessments provided were included in **Appendix E**, Supplemental DOCD (S-7530).

3.6 Shallow Hazards Assessment

Shallow hazards assessments for DC1 area were submitted in separate binders with plan S-7530. A list of these assessments is found in **Appendix E**, Supplemental DOCD (S-7530).

3.7 High-Resolution Seismic Lines

High-resolution (Kirchhoff) seismic lines close to the DC104 proposed well location is included in **Appendix C**: Geologic Structure Maps, Interpreted Seismic Lines, Geologic Cross-sections.

A discussion concerning the 3D high-resolution (HR3D) Seismic Lines specific to the Shallow Hazards Reports and Assessments are referred to in **Appendix E**, Supplemental DOCD (S-7530).

The BSEE (formerly MMS) approved the use of this HR3D seismic data for shallow hazards assessment on April 16, 2008 (ref: MS5231). This data was re-processed by Fugro Seismic Imaging in 2010, which improved the quality of subsurface imaging.

4 Hydrogen Sulfide (H_2S) Information

4.1 Concentration

It is not expected that H2S will be encountered during the operations proposed in this plan.

4.2 Classification

Based on previous drilling, no H2S is known to occur in the project area. bp has requested in earlier submissions that Green Canyon 743 Unit Area Blocks 699, 742, 743, and 744 be classified as a "Zone where the absence of H2S has been confirmed".

The following wells in the bp unit were drilled to similar geologic horizons as proposed by this DOCD without encountering H2S:

- GC 743 #5 (19,590-ft MD), oil sands in M57, M55 and M54
- GC 699 #1 WB2 (20,097-ft MD), oil sands in M55, M53 and M15
- GC 743 #3 (19,150-ft MD), oil sands in M57
- GC 743 DC123 (18,610-ft MD), oil sands in M57, M55, M54 and M53
- GC 743 #1 ST1 (18,488-ft MD), oil sands in M55, M54, M48, M40, M35, M25, M20 and M15
- GC743 Atlantis Phase 3 Wells including DC221 (22,610-ft MD), oil sands in M57, M55, and M54

Between the years 1998 and 2018, Atlantis acquired MDT samples in thirty (30) wellbores. These samples were acquired and analyzed from all middle Miocene producing reservoirs (M57, M55, M54, M53) as well as from lower Miocene reservoirs (M48, M40, M25, M20, M15). None of the analyzed MDT samples showed evidence of H2S gas.

BP requests that BOEM re-confirm the “H2S absent” classification.

4.3 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.

5 Mineral Resource Conservation Information

Technology and Reservoir Engineering Practices and Procedures, Technology and Recovery Practices and Procedures, and Reservoir Development Plans or descriptions were submitted in previous plans. These items are unrelated to or unaffected by this well location.

The well proposed by this revision is planned as a dual zone injection for the M57 and M55 reservoirs. However, BP intends to request permitting for injection into the M57, M55 and M54 zones. BP submitted a Supplemental Revision (CID) to the Resource Conservation Department in September 2023.

5.1 Technology and Reservoir Engineering Practices and Procedures

BP uses dual (redundant) downhole pressure and temperature gauges for reservoir surveillance. In addition, commingled mid-Miocene M55 / M54 & M57 / M55 producers using on / off downhole flow control technology allows for zonal surveillance as well as zonal intervention (i.e. water shut-offs). **DC104** is planned as a two-zone completion for M57 and M55 sands, with a contingency for the M54 if any subsurface issues happen i.e. faulted out.

5.2 Technology and Recovery Practices and Procedures

Primary drive mechanism will be aquifer drive for these wells. Analysis of the aquifer response to production, coupled with seismic imaging improvements, will dictate the benefit and timing of additional water injection and other recovery technologies.

5.3 Reservoir Developments

The Atlantis discovery well GC699 #1WB01 (and sidetrack WB02) encountered the main pay M55 and M54 sands, sub-salt, and down structure to the northeast. Both wellbores indicated a potential oil-water contact on the northeastern portion of Atlantis at approximately 17845' TVD-SS in the M55. Due to well stability problems, no reservoir pressures were obtained.

The Atlantis GC743 #1 well was drilled to the southwest of GC699 #1WB01 and encountered oil bearing M55 and M54 sands at 16,397-ft TVD-SS and 16,629'-ft TVD-SS respectively. This well was bypassed for whole core in the GC743#1BP01 and then sidetracked GC743#1ST01 back through the Middle and Early Miocene where additional oil-bearing sands were found (M57, M48, M40, M25, M20 and M15). Formation pressures and fluid samples were taken in these oil-bearing zones.

The GC743-2 well-built angle too rapidly and had to be bypassed. GC743-2BP1 crossed a large sub-salt fault interpreted to be roughly east-west that separates the north and south portions of the Atlantis structure. The main mid-Miocene pay sands (M55 & M54) were faulted out, although oil of good quality was encountered in lower mid-Miocene sands (M25 and M20). The GC743-2ST1 targeted the southeastern part of the structure, but a cone was left in the hole, requiring the well to be bypassed. The GC743-2-ST1-BP1 found pay in the M55 (full to base) and M54 (drilled an oil water contact) middle Miocene sands. Formation pressures were acquired in the M55 and M54 reservoirs.

The GC743 #3 well was a downdip test for oil-water contact in the main M57, M55, and M54 reservoirs. The GC743 #3 well found an oil bearing M57 sand at 17,851-ft TVD-SS and wet M55 and M54 sands at 18,262-ft and 18,579-ft TVD-SS respectively. Formation pressures taken in this well provided important constraints on the Atlantis Field M55 and M54 oil-water contacts. The parent wellbore to the GC743 #5ST1, the GC743 #5 (as well as the #5BP1 bypass for core) was drilled sub-salt, down structure in the central portion of the north side of Atlantis. The main pay sands M55 and M54 were oil charged and establish lowest known oil depths of approximately 17,540-ft TVD-SS in the M55 and 17,790-ft TVD-SS in the M54. In addition, a shallower, thin oil charged M57 sand was encountered. MDT pressure and fluids were collected in all oil sands. The deeper mid-Miocene and lower-Miocene sands were penetrated but wet.

The GC743 #5ST1, permanently abandoned since 2012, was drilled sub-salt up structure, and encountered oil charged M57, M55 and M54 mid-Miocene sands. MDT pressures were collected in all oil sands, while MDT fluids were collected in the M55 and M54 main pay sands. Fluid and pressure data suggest some degree of baffling / compartmentalization with the down structure GC743 #5 and #5BP1 wellbores.

The Atlantis Conservation Information Document (CID) discusses overall field plans. Supplemental revisions were last submitted in 2023.

6 Biological Information

6.1 High Density Deepwater Benthic Communities Information

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.

The pipeline route and components, and commissioning equipment will be located in areas previously surveyed to protect benthic communities. Hazard reports and Assessments are listed in previously submitted S-DOCD 7530 **Appendix E** and provided data confirming the absence of high-density benthic communities within the prescribed distances from drilling and subsea equipment.

6.2 Biologically Sensitive Underwater Features and Areas

The proposed activities will be conducted in a water depth of approximately 6500′ 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 operating in water depth less than 300-m (984-ft) in the Gulf of Mexico do not apply to this plan.

All proposed bottom-disturbing activities in this RDOCD 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 "Western and Central Gulf of Mexico Topographic Features Stipulation Map Package for Oil and Gas Leases in the Gulf of Mexico March 2018".

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

Coastal Endangered or Threatened species that may occur along the U.S. 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 and Queen conch) as indicated in EIA Table 6 and discussed in individual sections. Two other coastal bird species (Bald Eagle [*Haliaeetus leucocephalus*] and Brown Pelican [*Pelecanus occidentalis*]) are no longer federally listed as Endangered or Threatened; these are discussed in EIA Section C.4.2.

Five sea turtle species, the Rice's whale (*Balaenoptera ricei*), sperm whale (*Physeter macrocephalus*), oceanic whitetip shark (*Carcharhinus longimanus*), giant manta ray (*Mobula birostris*), and Black-capped petrel (*Pterodroma hasitata*) are the only Endangered or Threatened species that could potentially occur within 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 EIA Section C.3.5). No critical habitat has been designated in the Gulf of Mexico for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, sperm whale, or Black-capped Petrel.

Four Endangered mysticetes (blue whale [*Balaenoptera musculus*], fin whale [*Balaenoptera physalus*], North Atlantic right whale [*Eubalaena glacialis*], and sei whale [*Balaenoptera borealis*]) have been reported in the Gulf of Mexico, and are considered rare or extralimital (Würsig et al., 2017). These species are not included in the most recent NMFS stock assessment report (Hayes et al., 2022) nor in the most recent BOEM multisale EIS (BOEM, 2017); therefore, they are not considered further in the EIA. Additionally, Bryde's whales (*Balaenoptera edeni*) are known to have a global distribution in tropical and subtropical waters, including GOMx. However, they are generally only distinguishable from Rice's whales (which are also in the Bryde's whale complex) using DNA analysis; therefore, it is unclear whether any sightings in GOMx waters are Bryde's whales or Rice's whales. However, since Rice's whales are Endangered whereas Bryde's whales are not, GOMx visual and acoustic detections of any Bryde's whale complex individuals are generally assumed to be Rice's whales until proven otherwise by DNA.

The Rice's whale exists in the Gulf of Mexico as a small, resident population. This species was formally known as a subspecies to the Bryde's whale (*Balaenoptera edeni brydei*) until a DNA study identified it as a separate species (Rosel et al., 2021). It is the only baleen whale known to be resident to the Gulf of Mexico. 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 EIA C.3.2). The giant manta ray could occur in the project area but is most commonly observed in the Gulf of Mexico at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of Mexico 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. Nassau grouper critical habitat was designated in January 2024 and includes areas in the southeast Gulf of Mexico near the Dry Tortugas and Florida Keys. 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. The Panama City crayfish (*Procambarus econfinae*) is a coastal species in south-central Bay County, Florida and is not expected to occur in the project area.

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicronis*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), pillar coral (*Dendrogyra cylindrus*), and rough cactus coral (*Mycetophyllia ferox*). These seven species all have designated critical habitat in the Florida Keys; staghorn coral and elkhorn coral also have designated critical habitat near the Dry Tortugas. These corals are shallow water, zooxanthellate species (containing symbiotic photosynthetic zooxanthellae which contribute to their nutritional needs) and so are not present in the deepwater project area (see EIA Section C.3.17).

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

Endangered or threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in the table below, which is an excerpt of the Environmental Impact Analysis:

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Rice's whale[1]	*Balaenoptera ricei*	E	X	--	None
Sperm whale	*Physeter macrocephalus*	E	X	--	None
West Indian manatee	*Trichechus manatus*[2]	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T,E[3]	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); *Sargassum* habitat including most of the central & western Gulf of Mexico.
Green turtle	*Chelonia mydas*	T	X	X	None
Leatherback turtle	*Dermochelys coriacea*	E	X	X	None
Hawksbill turtle	*Eretmochelys imbricata*	E	X	X	None
Kemp's ridley turtle	*Lepidochelys kempii*	E	X	X	None
Birds					
Piping Plover	*Charadrius melodus*	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	*Grus americana*	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Rufa Red Knot	*Calidris canutus rufa*	T	--	X	None
Black-capped Petrel	*Pterodroma hesitata*	E	X	--	None
Fishes					
Oceanic whitetip shark	*Carcharhinus longimanus*	T	X	--	None
Giant manta ray	*Mobula birostris*	T	X	X	None
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	*Epinephelus striatus*	T	--	X	Florida Keys and the Dry Tortugas
Smalltooth sawfish	*Pristis pectinata*	E	--	X	Southwest Florida
Invertebrates					
Elkhorn coral	*Acropora palmata*	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	*Acropora cervicornis*	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	*Dendrogyra cylindrus*	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Rough cactus coral	*Mycetophyllia ferox*	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Lobed star coral	*Orbicella annularis*	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

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Mountainous star coral	*Orbicella faveolata*	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	*Orbicella franksi*	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	*Procambarus econfinae*	T	--	X	South-central Bay County, Florida
Queen conch	*Aliger gigas*	T	--	X	None
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus subsp. Ammobates, allophrys, trissyllepsis, and peninsularis, respectively*	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	*Microtus pennsylvanicus dukecampbelli*	E	--	X	None

E = Endangered; T = Threatened; X = potentially present; -- = not present.

1 In 2021, the National Marine Fisheries Service recognized that what had previously been accepted as a subspecies of the Bryde's whale is actually a separate species. The reclassification is formerly recognized under 86 *Federal Register* (FR) 47022 effective date 22 October 2021 as the Rice's whale (*Balaenoptera ricei*).

2 There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (T. m. manatus), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico.

3 The Northwest Atlantic Ocean Distinct Population Segment (DPS) of loggerhead turtles is designated as Threatened (76 FR 58868). The National Marine Fisheries Service and the U.S. Fish and Wildlife Service designated critical habitat for this DPS, including beaches and nearshore reproductive habitat in Mississippi, Alabama, and the Florida Panhandle as well as *Sargassum* spp. Habitat throughout most of the central and western Gulf of Mexico (79 FR 39756 and 79 FR 39856).

6.4 Archaeological Report

Green Canyon Area Blocks 699, 742, 743, and 744 are not located within the area of high archaeological potential as described in NTL No. 2011-JOINT-G-01. However, the recent mitigation guidelines released by BOEMRE in March 2011 entitled, "Pre-Seabed Disturbance Survey Mitigation," requires archaeological assessments prior to undertaking any bottom-disturbing activities, such as drilling a well. BP has provided Archaeological reports completed by a Marine Archaeologist with the Hazards Reports listed in Appendix E, of S-DOCD S-7530.

7 Wastes and Discharges Information

7.1 Projected Generated Wastes

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

7.2 Projected Ocean Discharges

A table providing information on the projected ocean discharges likely to be generated during the proposed activities is included in **Appendix F**: Waste and Discharge Tables

8 Air Emissions

8.1 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_2S 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

8.2 Air Emissions Summary

An emission workbook (BOEM Form 0139) showing Plan total emissions associated with the activities proposed in this revised DOCD document is included in Attachment 1 in Appendix E. The complex total emissions are the same as Plan S8058 AQR. That AQR is provided as Attachment 2 in Appendix E. The proposed total Plan emissions are summarized in the Table below. The proposed Total plan emissions are less than BOEM's emission exemption thresholds and as a result, no further review or controls are required.

COMPANY		AREA	BLOCK	LEASE	FACILITY	WELL			
BP Exploration & Production Inc.		Green Canyon	GC743 Unit Agreement #754305003	OCS-G 15604 - 15608 RUE 23579	Atlantis	DC104			
Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2024	83.22	50.21	48.70	1.21	1993.84	57.33	0.01	312.73	0.58
2025	83.22	50.21	48.70	1.21	1993.84	57.33	0.01	312.73	0.58
Allowable	4229.10			4229.10	4229.10	4229.10		85904.27	

8.3 Emissions Reduction Measures

Emission Source	Emission Reduction Method	Proposed Reductions (Tons/Year)	Monitoring System
Not applicable for this project			

The project BOEM 0139 Form emissions worksheet tabs (EMISSIONS1, EMISSIONS2) do not include emissions reduction measures.

8.4 Verification of Non-Default Emissions Factors

The project BOEM 0139 Form emissions worksheet tabs (EMISSIONS1, EMISSIONS2) do not include non-default emission factors.

8.5 Distance to Shore for Emission Exemption Thresholds (EET)

The distance to shore in statute miles is based on the same coordinate system used in the lease sale documents for the lease.

8.6 Non-Exempt Activities

The calculated maximum projected emissions of the facility are less than the respective EET calculated at 30 CFR § 550.303(d). The facility is therefore exempt from the requirements in 30 CFR § 550.303(e) through (i).

8.7 Hydrogen Sulfide

The requirements related to hydrogen sulfide (H2S) are not repeated here as they are addressed in section 4 of this DOCD.

8.8 Environmental Impact Analysis (EIA)

The requirements related to EIA are not repeated here as they are addressed in **Appendix I** of this Plan.

9 Oil Spill Information

9.1 Oil Spill Response Planning

9.1.1 Regional OSRP Information

An Oil Spill Response Plan (OSRP) was filed by BP America Inc. (Operator No. 21372) under cover letter dated July 12, 2022, on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481) and found in compliance by BSEE on November 29, 2022. Additional modifications were made to the approved OSRP under cover letter dated April 10, 2023, and confirmed in compliance by BSEE on May 30, 2023. Any spill from the vessel(s) conducting the activities covered by this DOCD would also be addressed by the vessel operator in accordance with the response plan of the vessel(s) from which the spill emanated.

9.1.2 Spill Response Site

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

9.1.3 OSRO Information

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 Green Canyon Area Block 743.

9.1.4 Worst-case Scenario Determination

Category	Regional OSRP Approved November 29, 2022 Drilling	Atlantis SDOCD S-7530 Plan Drilling	Regional OSRP Approved November 29, 2022 Production	Atlantis SDOCD S-7530 Plan Production
Type of Activity	Drilling > 10 miles	Plan Drilling >10 miles	Production > 10-miles	Production >10 miles
Facility Location	MC 778 (SL)	GC743	MC 822-11	Not Applicable
Facility Designation	Thunder Horse Well 778-15	MODU - GC699, DC312 Development Well	Thunder Horse PDQ – MC822-11	Not Applicable
Distance to Nearest Shoreline	68-miles	121-miles	68-miles	Not Applicable

Volume Facility Storage:				
Volume storage tanks and flowline (total)	50,000-bbls	0-bbls	50,000-bbls	Not Applicable
Volume released due to facility pipeline break	13,000-bbls	0-bbls	13,000-bbls	Not Applicable
Lease Term pipelines	0-bbls	1,648-bbls	0-bbls	Not Applicable
Daily Production Volume Max Well	0-bbls	0-bbls	55,000-bbls	Not Applicable
Volume Uncontrolled Blowout (Day 1)	360,000-bbls	179,400-bbls	0-bbls	Not Applicable
Total Volume	423,000-bbls	181,048-bbls	118,000-bbls	Not Applicable
Type of Oil(s) – (Crude Oil, Condensate, Diesel)	Crude	Crude	Crude	Not Applicable
API Gravity(s)	32.0	25.5	33.0	Not Applicable

BP has conducted an analysis of the well(s) proposed in this SDOCD and has concluded that the worst-case discharge scenario associated with the wells does not exceed the worst-case discharge scenario described in supplemental DOCD, S-7530.

Because the worst-case discharge scenario described in supplemental DOCD S-7530 does not exceed the worst-case discharge scenario covered by BP's current approved OSRP, the well(s) proposed in this SDOCD also do not supersede the worst-case scenario in BP's GoM Regional OSRP approved by BSEE on November 29, 2022.

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 November 29, 2022, and since the worst-case scenario determined for our Supplemental DOCD 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 this Supplemental DOCD.

See table above, which shows data from worst case discharge scenario wells in the previous Supplement DOCD S-7530 (MC778-15, DC312 and MC822-11).

Wellbore data, geologic data, reservoir data, and fluid data used in modeling and making the WCD determination are provided in **Appendix F** in the Proprietary Information copies of the supplemental DOCD S-7530.

10 Environmental Monitoring and Environmental Mitigation Measures Information

10.1 Monitoring Systems

In accordance with the conditions of approvals described in the NMFS 2020 Biological Opinion and its Appendices, as revised in 2021, a person onboard the rig will visually monitor the moonpool using a remote camera system. Daily logs will be kept for documenting the presence/absence of marine animals in the moonpool. If a protected species is observed in the moonpool, required reporting to the appropriate agencies will be made.

10.2 Incidental Takes

Additionally, mitigation measures described in Appendices A, B, C and J of the NMFS 2020, Biological Opinion (as revised 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 "GoM Incident Reporting Matrix for Offshore Activities". Further mitigation measures can be found throughout the supporting EIA.

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

Additionally, mitigation measures described in Appendices A, B, C & J of the NMFS 2020 Biological Opinion (as revised in 2021), will be implemented to the extent they are applicable to the activities outlined in this plan.

12 Related Facilities and Operations Information

12.1 Related OCS Facilities and Operations

The Atlantis project includes the use of either the Drill Ship Stena IceMax, the Drill Ship Black Lion, or the Drill Ship Black Hornet, the GC787 A Platform, existing and previously approved wells in Drill Center 1 and Drill Center 3, and previously approved and existing pipelines, umbilical, and other appurtenances. The Lease Term Pipelines are designed to transport hydrocarbon from the new DC2 to existing DC1. The hydrocarbons will be transported to GC787, A Platform on previously approved and existing pipelines from DC1. The Atlantis production will be transported from the platform by the existing export pipeline system. Other than these Atlantis project facilities and operations, there are no other existing drilling units, production platforms, pipeline accessory platforms, host facilities, pipelines and associated umbilical, or other facilities and operations located on the OCS that directly relate to the proposed development activities.

12.2 Transportation Systems

The Atlantis production will be transported by the existing export pipeline system. Gas production from wells in the Green Canyon Block 743 Unit will continue to be measured for sales and royalty purposes on the Atlantis Green Canyon Block 787 A Platform, a semisubmersible Production Quarter (PQ) Facility, prior to delivery to shore via Operations System Nos. 23.5/ H00, 24.0/ XWO, and/or 26.5/K00. Liquid hydrocarbons from the Green Canyon Block 743 Unit will continue to be measured for sales and royalty purposes using an LACT unit located on this same facility prior to delivery to shore via the Cameron Highway Oil Pipeline System (Operations System No. 2.5), the

Poseidon Pipeline System (Operations System No. 29.5), and / or the Amberjack Pipeline System (Operations System No. 36.5).

12.3 Produced Liquid Hydrocarbons Transportation Vessels

There are currently no plans to transport produced liquid hydrocarbons including well test fluids by means other than the export system described in Section 12.2.

13 Support Vessels and Aircraft Information

In accordance with the NMFS 2020 Biological Opinion (as revised in 2021), transit routes will avoid the Rice's whale (formerly Bryde's whale) area. As outlined in the table below, vessels will transit directly from shorebases in Louisiana to the blocks where activities will occur under this SDOCD.

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
Aircraft-Helicopter	760-gallons	2	10 rt/week
Crew boats	928-bbls	2	Every 3 days
Supply boats	7,000-bbls	3	Every 2 days

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 280-ft.	50,000 gallons (boat fuel) 150-K to 250-K gallons of transferable fuel (rig fuel)	Weekly as needed	From the shorebase in Fourchon, LA to GC 743, GC Field 787

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 activity is included in Table 2 found in **Appendix F**.

13.4 Onshore Support Facilities Information

The onshore support base for the proposed operations will be in Fourchon, Louisiana, Green Canyon Area Block 787 is located approximately 121 miles from the onshore support base located in Fourchon, Louisiana; refer to **Appendix B** for vicinity map.

The following table provides information about 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
Heliport	Houma, LA	Existing
Core Yard	Theodore, AL	Existing
Ship Channel Shorebase	Houston, TX	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 activities. The C-Port Fourchon facility is located approximately 129 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 a 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.

13.5 Support Base Construction or Expansion

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

14 Coastal Zone Management Act (CZMA) Information

14.1 Consistency Certification

No updates or changes made to this section when compared to previously approved Supplemental DOCD (S-8058) on December 21, 2021.

15 Environmental Impact Analysis (EIA)

A project specific EIA has been created and is in **Appendix I**.

16 Administrative Information

16.1 Exempted information Description

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

- Geologic Objectives (BHL, TVD and MD) on BOEM-137 forms
- Production rates and life of reservoirs
- Proprietary New or Unusual Technology
- Geological and Geophysical Information (except for non-proprietary Shallow Hazard Assessment)
- Hydrogen Sulfide Correlative Well Information

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

16.2 Bibliography

Previously Approved DOCDs for GC743 Unit Blocks

SHL	BHL	Lease No.	BP ID	Well Names, Subsea Structure	Plan No.	Approval Date
GC743	GC742 GC743	15606 15607	Initial Plan	Platform and Wells A, B4, B5, C4, C5, D, E4, E5, F, G5, I, J, M57-1, M57-2, N, U, Inj B, C, F, and J GC743 Unit Total = 20 Wells	N7646	9/12/2003
GC743	GC742 GC743	15606 15607	ADC	Revise Subsea Arch – DC1, GC743 and Re-assigned Well Names by Manifold DC111 to DC114, DC121 to DC124, DC131 to DC134, DC141 to DC144, DC101 to DC104	R4369	12/4/2006
GC743	GC743	15607	ANFD	Drill Center 3: Add Well DC313, + Subsea Architecture, GC743	S6999	2/12/2007
GC743	GC699 GC700 GC743	15604 15605 15607	DC3 -Phase 2B	DC311, DC312, DC321, DC323, DC324 (GC743) + DC314 (GC699) + DC322 (GC700) + Subsea Architecture, GC743	S7328	8/4/2009
GC743	GC744	15608	GC744, DC131	Revise BHL DC131 to GC744 GC743 Unit Total = 28 Wells	R4969	9/11/2009
GC743	GC699 GC743	15604 15607	DC3-Man 2-Batch	DC321, DC322, DC323, and DC324 Batch Operations	R-5593	5/31/2012
GC743	GC699 GC700 GC743 GC744	15604 15605 15606 15607	DC1+ DC3, Subsea and Plt A	DC101, DC103, DC106, DC121, DC141, DC132, DC134, DC141, DC311, DC312, DC317, DC321, DC322, DC323, DC324.	S-7530	7/13/2012
GC743	GC743	15607	West Auriga Rig in DC1+DC3 + Subsea	DC101, DC103, DC104, DC121, DC141, DC132, DC134, DC141, DC311, DC312, DC317, DC321, DC322, DC323, DC324	R-5984	1/30/2014
GC743	GC699	15604	DC323	DC323 BHL Change to GC699	R-6173	10/16/2014
GC743	GC699 GC700 GC743 GC744	15604 15605 15606 15607	DC104 & DC801	Well Revised: GC743, Well DC104 New Well Name: GC743, Well DC801	R-6308	6/5/2015
GC743	GC743	15607	West Vela DC2	DC212, DC213, DC214, DC215, DC221, DC222, DC223, DC224	S-7944	8/29/2019
GC743	GC743	15607	H2S Field Designation	Revised H2S Classification for Atlantis Field as H2S Absent	R-6976	8/28/2020
GC743	GC743	15607	West Auriga DC2 + Subsea	DC802, DC803, DC227 and DC228	S-8058	12/21/2021
GC743	GC743	15607	Stena IceMax – DC1	DC123ST	R-7293	Deemed Submitted

Well Status Chart

Updated table to show current well names and status at time of submission. The proposed new wells are **bolded**.

WELL	Spud	TD*	Status	Proposed or Actual BHL Block
DRILL CENTER 1 (DC1)				
DC101	NO	NO	Proposed Water Injector, not yet spud	GC743
DC102	2009	X	Active Water Injector	GC743
DC103	2011	X	SI	GC743
DC801 (Previously DC104)	2015	X	Active Water Injector	GC743
DC802	2022	X	Active Water Injector	GC743
DC802 Contingency	NO	NO	Proposed, not drilled	GC743
DC803	NO	NO	Proposed Water Injector, not yet spud	GC743
DC803 Contingency	NO	NO	Proposed Water Injector, not yet spud	GC743
DC111	2004	X	Producing	GC743
DC112 ST1	2007	X	Producing	GC743
DC113 BP2	2008	X	Producing	GC743
DC114	2004	X	SI	GC743
DC121ST1BP1	2014	X	Producing	GC743
DC122 ST1	2007	X	Producing	GC743
DC123	2004	X	Proposed TA for sidetrack	GC743
DC123 ST1	**NO**	**NO**	**Proposed, spud in 2024**	**GC743**
DC124 ST2	2004	X	Producing	GC743
DC131	2004	X	Producing	GC744
DC132	2004	X	Producing	GC743
DC133 BP1 (Current)	2010	X	Producing	GC743
DC134	2004	X	Producing	GC743
DC141	2004	X	Producing	GC743
DC142	2004	X	Producing	GC742
DC143	2004	X	Producing	GC743
DC144	2004	X	Producing	GC743 Actual BHL [Original GC742]
DRILL CENTER 3 (DC3)				
DC311	2009	X	Producing	GC743
DC312 BP1	2012	X	Producing	GC699
DC313 (#5 ST1)	2003	X	PA'd	GC743
DC314 ST1	2010	X	Producing	GC743
DC317	2012	X	Producing	GC743
DC321	2012	X	Producing	GC743
DC322 BP2	2013	X	SI	GC699
DC323 (BHL Change)	2012	X	Producing	GC743
DC324	2012	X	Producing	GC743
DRILL CENTER 2 (DC2)				
DC212	2019	X	Producing	GC743
DC213	2019	X	Producing	GC743
DC214	2019	NO	Proposed well; not producing	GC743
DC215	2019	X	Producing	GC743
DC221	2019	X	Producing	GC743
DC222	2019	NO	Initial Wellbore drilled; TA'd	GC743
DC223	2019	NO	Initial Wellbore drilled; TA'd	GC743
DC224	2019	NO	Initial Wellbore drilled; TA'd	GC743
DC227	NO	NO	Proposed well; not drilled	GC743
DC228	2023	X	Producing	GC743

16.3 Other Reference Items

There are no changes to the reference items previously submitted in Supplemental Plan S-7530, that are related to or affected by the proposed change in well and pipeline locations.

- Bureau of Ocean Energy Management. 2017a. Gulf of Mexico OCS Oil and Gas Lease Sales: 2017-2025. Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261. Final Multisale Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2017-009.

- Bureau of Ocean Energy Management. 2017b. Gulf of Mexico OCS Oil and Gas Lease Sale. Final Supplemental Environmental Impact Statement 2018. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2017-074.

- 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, revised April 24, 2021

16.4 Recovery Fees

Appendix K: Recovery Fee Receipt not required by 30 CFR § 250.125 for Supplemental DOCD.

Appendix A: Plan Information Forms

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

OMB Control Number: 1010-0151
OMB Approval Expires: 6/30/2021

OCS PLAN INFORMATION FORM

General Information

Type of OCS Plan		Exploration Plan (EP)		Development Operations Coordination Document (DOCD)	SDOCD
Company Name: BP Exploration and Production Inc.				BOEM Operator Number: 02481	
Address:				Contact Person: Kevin Stanley	
501 Westlake Park Blvd. Houston TX. 77079				Phone Number: 713-865-3786	
				E-Mail Address: kevin.stanley@bp.com	

If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid		Receipt No.	

Project and Worst-Case Discharge (WCD) Information

Lease(s): N/A	Area: GC	Block(s): 699,742,743, 744, 787	Project Name (If Applicable): DC1X

Objective(s)	X	Oil		Gas		Sulphur		Salt	Onshore Support Base(s): C Port 3, Port Fourchon

Platform/Well Name: DC104	Total Volume of WCD: 18.8 mmbo over 120 days	API Gravity: 30.7
Distance to Closest Land (Miles): 128.37	Volume from uncontrolled blowout: 179,400 stb/d oil	

Have you previously provided information to verify the calculations and assumptions for your WCD?	X	Yes		No
If so, provide the Control Number of the EP or DOCD with which this information was provided	S-7530			
Do you propose to use new or unusual technology to conduct your activities?	X	Yes		No
Do you propose to use a vessel with anchors to install or modify a structure?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No

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

Proposed Activity	Start Date	End Date	No. of Days
Exploration drilling	N/A	N/A	N/A
Development drilling	10/28/2024	1/11/2025	75
Well completion	1/11/2025	3/20/2025	68
Well test flaring (for more than 48 hours)			Event Driven
Installation or modification of structure	N/A	N/A	N/A
Installation of production facilities	N/A	N/A	N/A
Installation of subsea wellheads and/or manifolds	3/15/2025	3/20/2025	5
Installation of lease term pipelines	3/20/2025	3/25/2025	5
Commence production	3/28/2025	2045	20 years
Other (Specify and attach description)	N/A	N/A	

Description of Drilling Rig

N/A	Jackup	X	Drillship
N/A	Gorilla Jackup		Platform rig
N/A	Semisubmersible		Submersible
N/A	DP Semisubmersible		Other (Attach Description)
Support Vessel Name (If Known):			

Description of Structure

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

Description of Lease Term Pipelines

From (Facility/Area/Block)	To (Facility/Area/Block)	Diameter (Inches)	Length (Feet)
Atlantis/GC743/DC1	Atlantis/GC743/DC1	7.69”	~155’

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): DC104 Primary		Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 179,400 stb/d oil	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	25.5

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	G-15607	G-15607	
Area Name	GC	GC	
Block No.	743	743	
Blockline Departures (in feet)	N/S Departure: 6058.91 FSL	N/S Departure:	N/S Departure: N/A F____ L
	E/W Departure: 7076.55 FWL	E/W Departure:	E/W Departure: N/A F____ L
Lambert X-Y coordinates	X: 2604836.55’	X:	X:
	Y: 9890218.91’	Y:	Y:
Latitude/ Longitude	Latitude: 27° 13’25.828” N	Latitude:	Latitude:
	Longitude: 90° 01’ 55.639” N	Longitude:	Longitude:

Water Depth (Feet): 6832	MD (Feet): 19968	TVD (Feet): 18764	MD (Feet):	TVD (Feet):
Anchor Radius (if applicable) in feet: N/A				

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

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
N/A					

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

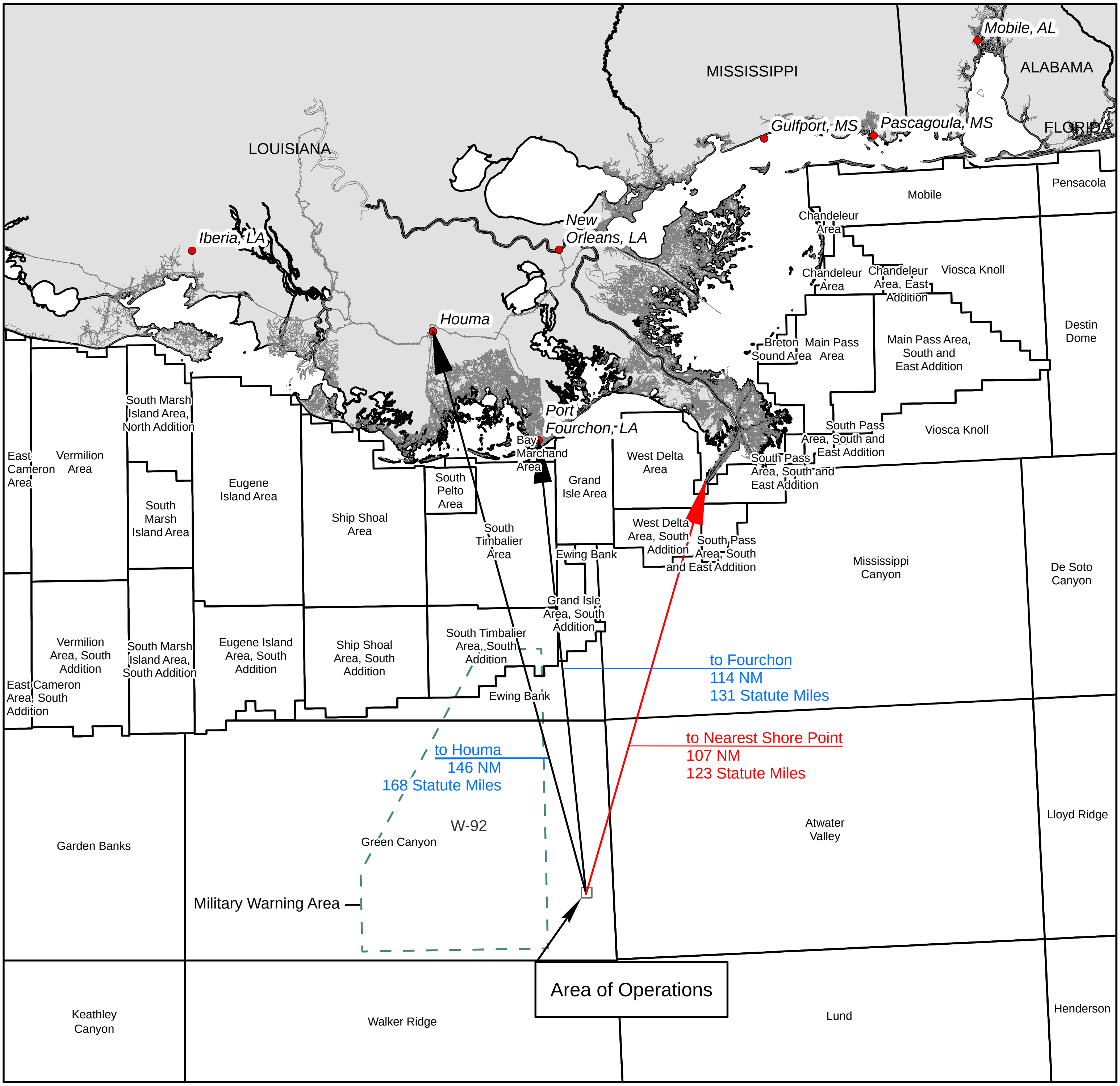
<table>
<tr><td colspan="9">Proposed Well/Structure
Location</td></tr>
<tr><td colspan="3">Well or Structure Name/Number (If renaming well or structure, reference previous name): DC104 Contingency</td><td colspan="2">Previously reviewed under an approved EP or DOCD?</td><td></td><td>Yes</td><td>X</td><td>No</td></tr>
<tr><td>Is this an existing well or structure?</td><td></td><td>Yes</td><td>X</td><td>No</td><td colspan="2">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="2"></td></tr>
<tr><td colspan="5">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X</td><td>Yes</td><td></td><td>No</td></tr>
<tr><td>WCD info</td><td colspan="2">For wells, volume of uncontrolled blowout (Bbls/day): 179,400 stb/d oil</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls):</td><td colspan="2">API Gravity of fluid</td><td colspan="2">25.5</td></tr>
<tr><td></td><td colspan="2">Surface Location</td><td colspan="2">Bottom-Hole Location (For Wells)</td><td colspan="4">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td colspan="2">G-15607</td><td colspan="2">G-15607</td><td colspan="4"></td></tr>
<tr><td>Area Name</td><td colspan="2">GC</td><td colspan="2">GC</td><td colspan="4"></td></tr>
<tr><td>Block No.</td><td colspan="2">743</td><td colspan="2">743</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td colspan="2">N/S Departure: 6040.17 FSL</td><td colspan="2">N/S Departure:</td><td colspan="4">N/S Departure: N/A F____ L</td></tr>
<tr><td colspan="2">E/W Departure: 7052.39 FWL</td><td colspan="2">E/W Departure:</td><td colspan="4">E/W Departure: N/A F____ L</td></tr>
<tr><td rowspan="2">Lambert X-Y coordinates</td><td colspan="2">X: 2604812.39’</td><td colspan="2">X:</td><td colspan="4">X:</td></tr>
<tr><td colspan="2">Y: 9890200.17’</td><td colspan="2">Y:</td><td colspan="4">Y:</td></tr>
<tr><td rowspan="2">Latitude/ Longitude</td><td colspan="2">Latitude: 27° 13’25.648” N</td><td colspan="2">Latitude:</td><td colspan="4">Latitude:</td></tr>
<tr><td colspan="2">Longitude: 90° 1’55.911” W</td><td colspan="2">Longitude:</td><td colspan="4">Longitude:</td></tr>
<tr><td colspan="3">Water Depth (Feet): 6833</td><td>MD (Feet): 19968</td><td>TVD (Feet): 18764</td><td colspan="2" rowspan="2">MD (Feet):</td><td colspan="2" rowspan="2">TVD (Feet):</td></tr>
<tr><td colspan="4">Anchor Radius (if applicable) in feet:</td><td></td></tr>
</table>

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

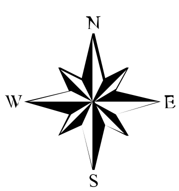
Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
N/A					

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

Appendix B: Vicinity and Location Plats



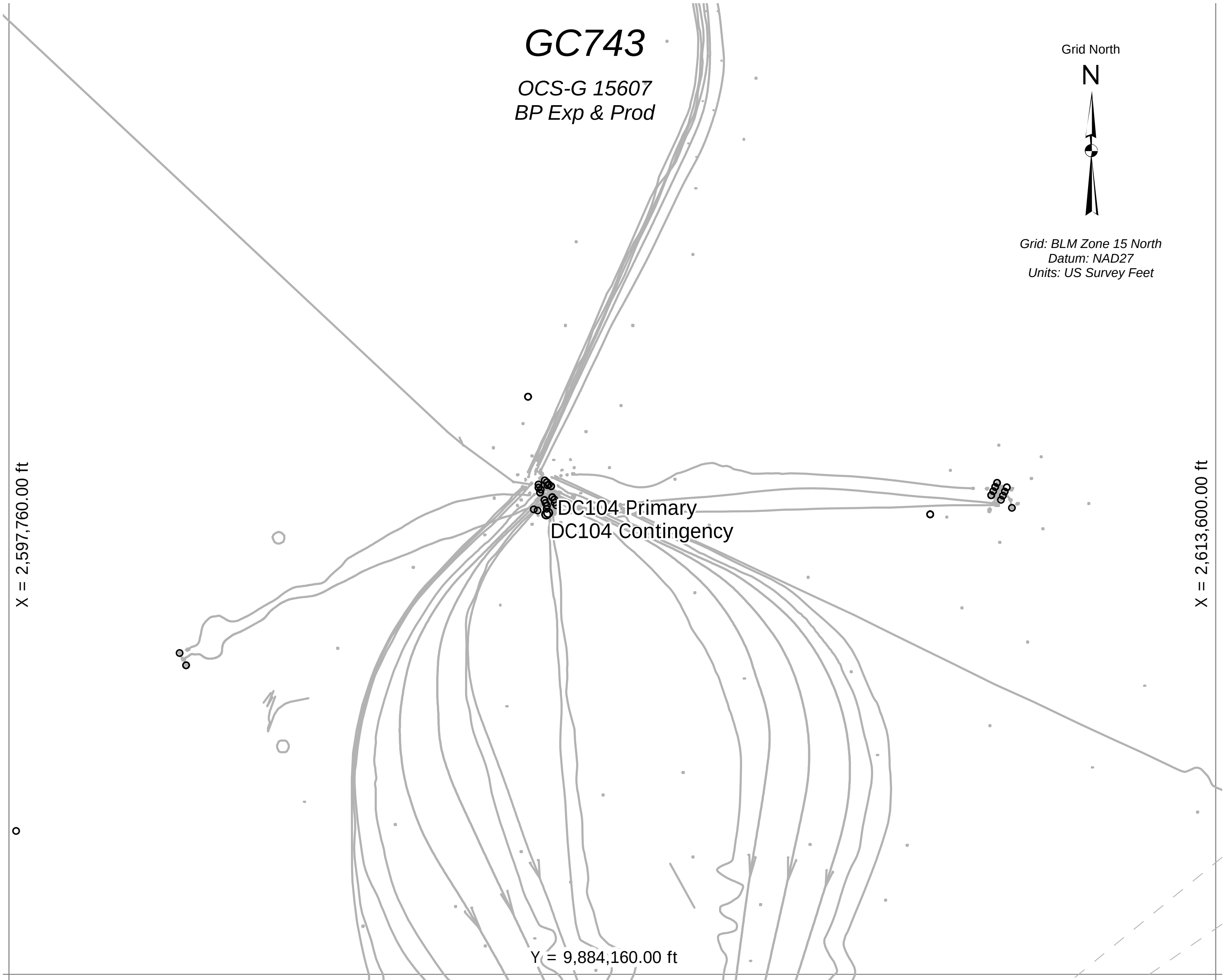
Note: DC104 Primary in GC743 used for distance calculations to the shoreline. The shoreline used is the NOAA 1:24K Continuously Updated Shoreline Product (CUSP).



Grid: BLM Zone 15 North
Datum: NAD27
Units: US Survey Feet

"Vicinity Chart"

bp	BP EXPLORATION AND PRODUCTION	Scale 1" = 40 miles
	Proposed Well Locations OCS-G15607 GC743 DC104 Primary and Contingency	Date: 3/15/2024
	Green Canyon Area (OPD# NG15-03) Block 743 *Offshore Federal*	
	Plat prepared by: Ian Dootson (BP Solutions)	ID

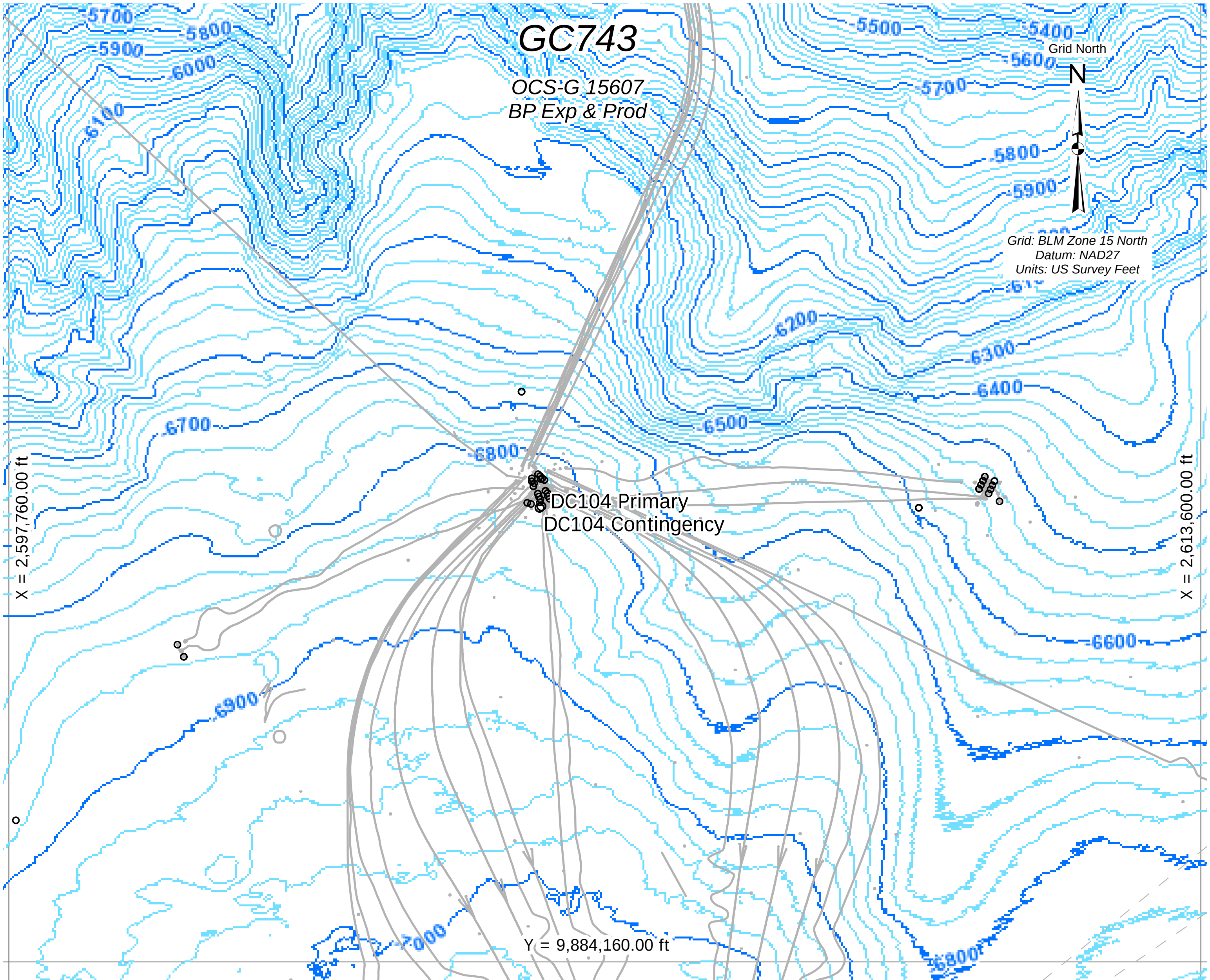


	Well	BLM Zone 15 North NAD27 - US Survey Feet Eas t ng	Northing	GC BLK	Block Ties FWL	FSL	NAD27 Lat/Long Lat tude	Longitude	NAD83 Lat/Long Lat tude	Longitude	Depth	
SHL	DC104 Primary	2,604,836.55	9,890,218.91	743	7,076.55	6,058.91	27 13 25.828N	90 01 55.639W	27 13 26.824N	90 01 55.745W	6,828	Depth MSL
	DC104 Cont ngency	2,604,812.39	9,890,200.17	743	7,052.39	6,040.17	27 13 25.648N	90 01 55.911W	27 13 26.644N	90 01 56.018W	6,829	

Notes:
1) All spatial data based on BLM Zone 15 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 data based upon BSEE data as of March 2024 and internal BP sources;

"Public"

bp	BP EXPLORATION AND PRODUCTION	Scale 1" = 2000 ft
	Proposed Well Locations OCS-G15607 GC743 DC104 Primary and Contingency	Date: 3/15/2024
	Green Canyon Area (OPD# NG15-03) Block 743 *Offshore Federal*	
	Plat prepared by: Ian Dootson (BP Solutions)	ID



	Well	BLM Zone 15 North NAD27 - US Survey Feet Eastng	Northing	GC BLK	Block Ties FWL	FSL	NAD27 Lat/Long Lattude	Longitude	NAD83 Lat/Long Lattude	Longitude	Depth	
SHL	DC104 Primary	2,604,836.55	9,890,218.91	743	7,076.55	6,058.91	27 13 25.828N	90 01 55.639W	27 13 26.824N	90 01 55.745W	6,828	Depth MSL
	DC104 Contngency	2,604,812.39	9,890,200.17	743	7,052.39	6,040.17	27 13 25.648N	90 01 55.911W	27 13 26.644N	90 01 56.018W	6,829	

Geospatial Americas Team

Notes:
1) All spatial data based on BLM Zone 15 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 data based upon BSEE data as of March 2024 and internal BP sources;
4) Bathymetry derived from 2001 AUV data

"Bathymetry"

bp	BP EXPLORATION AND PRODUCTION	Scale 1" = 2000 ft
	Proposed Well Locations OCS-G15607 GC743 DC104 Primary and Contingency	Date: 3/15/2024
	Green Canyon Area (OPD# NG15-03) Block 743 *Offshore Federal*	
	Plat prepared by: Ian Dootson (BP Solutions)	ID

Appendix C: Geologic Structure Maps, Interpreted Seismic Lines, Cross-sections

GulfofMexico

bp

BP Exploration & Production Inc.

Gulf of Mexico

Supplemental

Development Operations Coordination Document

Appendix C Insert

A geological description, maps and seismic for this activity are included in the "Proprietary Information" copy of this Revised DOCD.

Appendix D: Shallow Hazards Archaeological Report and Hazard Assessment

GulfofMexico

BP Exploration & Production Inc.

Gulf of Mexico

Supplemental

Development Operations Coordination Document

Appendix D Insert

Shallow hazards assessment for DC1 area were submitted in separate binders with plan S-7530.

A list of these assessments is found in Appendix E, Supplemental DOCD (S-7530).

Appendix E: Air Emissions Information – Form BOEM-0139

Attachment 1: Plan Total Emissions Worksheet

Attachment 1
Plan Total Emissions Worksheet

COMPANY	BP Exploration & Production Inc.
AREA	Green Canyon
BLOCK	GC743 Unit Agreement #754305003
LEASE	OCS-G 15604 - 15608 RUE 23579
FACILITY	Atlantis
WELL	DC104
COMPANY CONTACT	Ramesh Gopal (Air Quality Review)/Kevin Stanley
TELEPHONE NO.	346-744-5737 / 713-865-3786
REMARKS	Drill and complete 1 well

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:		
YEAR	NUMBER OF PIPELINES	TOTAL NUMBER OF CONSTRUCTION DAYS
2024	see OSC Plan Info Form 0137	
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		

AIR EMISSIONS COMPUTATION FACTORS

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/chief/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/chief/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/chief/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/chief/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/ch01/final/c01s03.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	
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	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
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	
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	https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_02-05-18.pdf
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						19.240				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						44.747				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	
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	https://www.epa.gov/moves/nonroad2008a-installation-and-updates
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

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

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

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #75430	OCS-G 15604 -	Atlantis	DC104					Ramesh Gopal (Air Quality Review		346-744-5737 / 713-865-3786		Drill and complete 1 well										
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 **(Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)**																									
DRILLING: Stena IceMax	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**																								
Main Engines + E-Gen: 6 x Wartsila 16V32C + electric drive e-gen	VESSELS- Drilling - Propulsion Engine - Diesel		61794	3179.05	76297.30	24	135	43.59	26.30	25.51	0.63	1044.49	30.03	0.00	163.83	0.30	70.62	42.61	41.33	1.03	1692.07	48.65	0.00	265.40	0.49
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.62	3086.76	24	135	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.86	1.72	1.67	0.04	68.46	1.97	0.00	10.74	0.02
CONSTRUCTION / INSTALLATION: **(Substitution likely with similar vessels of same or lower horsepower)**																									
MV Holiday																									
Main Engines: 2 x Cat C280-16	VESSELS -Construction/Intervention - Diesel		34000	1749.16	41979.94	24	27	23.99	14.47	14.04	0.35	574.69	16.52	0.00	90.14	0.17	7.77	4.69	4.55	0.11	186.20	5.35	0.00	29.21	0.05
Generators: 5 x 910kW	VESSELS – Prime Engine, Auxiliary		6100	313.82	7531.69	24	27	4.30	2.60	2.52	0.06	103.11	2.96	0.00	16.17	0.03	1.39	0.84	0.82	0.02	33.41	0.96	0.00	5.24	0.01
Egen: 1 x 250 kW	VESSELS – Prime Engine, Auxiliary		335	17.23	413.63	2	4	0.24	0.14	0.14	0.00	5.66	0.16	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Temporary Large/ Small Auxiliary Engines	VESSELS – Prime Engine, Auxiliary		2500	128.62	3086.76	24	27	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.57	0.34	0.33	0.01	13.69	0.39	0.00	2.15	0.00
2024	**Facility Total Emissions**							**75.65**	**45.64**	**44.27**	**1.10**	**1,812.46**	**52.11**	**0.01**	**284.28**	**0.53**	**83.22**	**50.21**	**48.70**	**1.21**	**1,993.84**	**57.33**	**0.01**	**312.73**	**0.58**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,229.10**			**4,229.10**	**4,229.10**	**4,229.10**		**85,904.27**	
	127.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	135	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	8.23	4.96	4.82	0.12	197.15	5.67	0.00	30.92	0.06
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
CONSTRUCTION/ INSTALLATION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	14	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.85	0.51	0.50	0.01	20.45	0.59	0.00	3.21	0.01
2024	**Non-Facility Total Emissions**							**20.32**	**12.26**	**11.89**	**0.30**	**486.80**	**14.00**	**0.00**	**76.35**	**0.14**	**13.96**	**8.42**	**8.17**	**0.20**	**334.43**	**9.62**	**0.00**	**52.45**	**0.10**

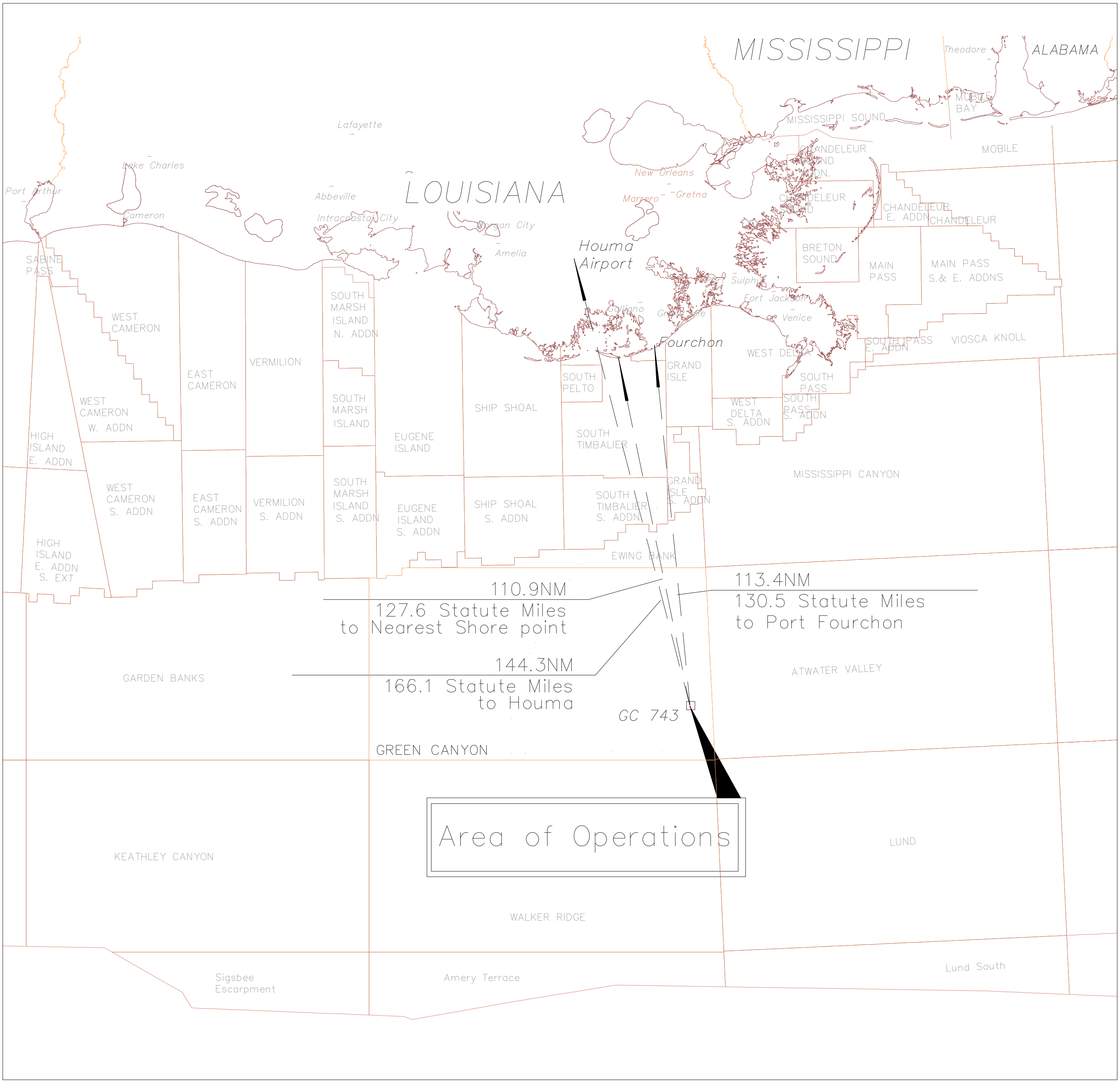
AIR EMISSIONS CALCULATIONS - 1ST YEAR

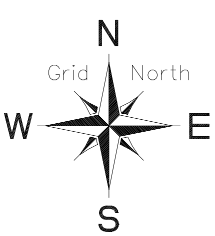
COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #75430	OCS-G 15604 -	Atlantis	DC104					Ramesh Gopal (Air Quality Review		346-744-5737 / 713-865-3786		Drill and complete 1 well										
OPERATIONS	**EQUIPMENT**	**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 **(Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)**																									
DRILLING: Stena IceMax	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**																								
Main Engines + E-Gen: 6 x Wartsila 16V32C + electric drive e-gen	VESSELS- Drilling - Propulsion Engine - Diesel		61794	3179.05	76297.30	24	135	43.59	26.30	25.51	0.63	1044.49	30.03	0.00	163.83	0.30	70.62	42.61	41.33	1.03	1692.07	48.65	0.00	265.40	0.49
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.62	3086.76	24	135	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.86	1.72	1.67	0.04	68.46	1.97	0.00	10.74	0.02
CONSTRUCTION / INSTALLATION: **(Substitution likely with similar vessels of same or lower horsepower)**																									
MV Holiday																									
Main Engines: 2 x Cat C280-16	VESSELS -Construction/Intervention - Diesel		34000	1749.16	41979.94	24	27	23.99	14.47	14.04	0.35	574.69	16.52	0.00	90.14	0.17	7.77	4.69	4.55	0.11	186.20	5.35	0.00	29.21	0.05
Generators: 5 x 910kW	VESSELS – Prime Engine, Auxiliary		6100	313.82	7531.69	24	27	4.30	2.60	2.52	0.06	103.11	2.96	0.00	16.17	0.03	1.39	0.84	0.82	0.02	33.41	0.96	0.00	5.24	0.01
Egen: 1 x 250 kW	VESSELS – Prime Engine, Auxiliary		335	17.23	413.63	2	4	0.24	0.14	0.14	0.00	5.66	0.16	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Temporary Large/ Small Auxiliary Engines	VESSELS – Prime Engine, Auxiliary		2500	128.62	3086.76	24	27	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.57	0.34	0.33	0.01	13.69	0.39	0.00	2.15	0.00
2025	**Facility Total Emissions**							**75.65**	**45.64**	**44.27**	**1.10**	**1,812.46**	**52.11**	**0.01**	**284.28**	**0.53**	**83.22**	**50.21**	**48.70**	**1.21**	**1,993.84**	**57.33**	**0.01**	**312.73**	**0.58**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,229.10**			**4,229.10**	**4,229.10**	**4,229.10**		**85,904.27**	
	127.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	135	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	8.23	4.96	4.82	0.12	197.15	5.67	0.00	30.92	0.06
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
CONSTRUCTION/ INSTALLATION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	14	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.85	0.51	0.50	0.01	20.45	0.59	0.00	3.21	0.01
2025	**Non-Facility Total Emissions**							**20.32**	**12.26**	**11.89**	**0.30**	**486.80**	**14.00**	**0.00**	**76.35**	**0.14**	**13.96**	**8.42**	**8.17**	**0.20**	**334.43**	**9.62**	**0.00**	**52.45**	**0.10**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL
BP Exploration & Production Inc.	Green Canyon	GC743 Unit Agreement #754305003	OCS-G 15604 - 15608 RUE 23579	Atlantis	DC104

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2024	83.22	50.21	48.70	1.21	1993.84	57.33	0.01	312.73	0.58
2025	83.22	50.21	48.70	1.21	1993.84	57.33	0.01	312.73	0.58
Allowable	4229.10			4229.10	4229.10	4229.10		85904.27	





Note: Nearest Louisiana shoreline distance was computed from the Proposed Location of the DC104 well to the nearest shoreline feature as represented in the NOAA 1:24k Continuously Updated Shoreline Product (CUSP). This vector Database is a more current, detailed, and correct representation of the actual shoreline than the NOAA 1:80k Medium-Resolution Vector Shoreline Database, which was based on medium-scale charts compiled by NOAA in the 1980's and which no longer accurately reflects the actual shoreline position in many locations, especially along the Mississippi River Delta.

Grid: UTM Zone 15 North
Datum: NAD27
Units: US Survey Feet

"VICINITY CHART"

bp	BP EXPLORATION AND PRODUCTION	*Scale 1" = 50 miles*
	Proposed DC104 Well Location	*Date: 22 Aug 2023*
	Green Canyon Area (OPD# NH15-03) Block 743 *Offshore Federal*	
	Plat prepared by: Wade McGee, Senior Surveyor, bp America Inc	

M/V HOLIDAY

288′ ANCHOR HANDLING TUG SUPPLY VESSEL

EDISON CHOUEST OFFSHORE

16201 East Main Street, Cut Off, LA 70345 | 985-601-4444 | www.chouest.com

REGISTRATION

Hull	245
Vessel Type	Anchor Handling Tug Supply Vessel
Year Built	2010
Shipyard	North American Shipbuilding

DIMENSIONS

Dimensions	288 ft. X 66 ft. X 29.6 ft (87.78 m X 20.12 m X 8.99 m)
Draft (Lightship)	17.5 ft. (5.33 m)
Draft (Loadline)	23 ft. (7.01 m)
Clear Deck	116 ft. 10 in. x 54 ft. (35.36 m x 16.46 m)
Cargo Deck Area	5,793 sq. ft. (538 sq. m)
Deck Strength	1,200 lbs. per sq. ft. (5.86 MT per sq. m)
Deck Cargo Capacity	760 LT (772 MT)
Deadweight Tonnage	4,130 LT (4,196.27 MT)

CAPACITIES

Fuel Oil	411,127 gals. (1556.28 cu. m)
Ballast/Rig Water	490,584 gals. (1857.06 cu. m)
Potable Water	72,098 gals. (272.92 cu. m)
Dry Bulk	10,820 cu. ft. @ 80 psi (306.39 cu. m @ 5.5 bars)
Liquid Mud	7,900 barrels (1,256 cu. m)
Lift Compensation	119,400 gals. (451 cu. m)

MACHINERY

Main Engines	Two (2) C280-16 Cat Diesels, 15,200 BHP
Propulsion	Two (2) x 4,000 mm C.P. in nozzles
Bow Thrusters	One (1) 1,200 HP Tunnel
Bow Thrusters	One (1) 1,200 HP Drop-Down Azimuthing
Stern Thrusters	One (1) 1,200 HP Tunnel
Speed	14 knots
Generators	Five (5) x 910 kW

Generators	One (1) x 250 kW emergency

TOWING AND ANCHOR HANDLING (DECK EQUIPMENT)

Winches	Three (3) Drum Waterfall, 500 MT Line Pull
Tow Drums	27,140 ft. (8,272 m) of 3 in. wire
Tow Drums	23,125 ft. (7,048 m) of 3.25 in. wire
Tow Drums	19,939 ft. (6,077 m) of 3.5 in. wire
Tow Drums	9,000 ft. (2,743 m) of 6.75 in rope
Tow Drums	7,500 ft. (2,286 m) of 7.25 in. rope
Anchor Handling Drums	13,000 ft. (3,962 m) of 3 in. wire on 2 Anchor Drums
Anchor Handling Drums	11,189 ft. (3,410 m) of 3.25 in wire on 2 Anchor Drums
Anchor Handling Drums	9,648 ft. (2,940 m) of 3.875 in. wire on 2 Anchor Drums
Chain Locker Capacity	5,300 ft. (1,600 m) of 3 in. chain in 4 lockers
Chain Locker Capacity	4,526 ft. (1,380 m) of 3.25 in. chain in 4 lockers
Chain Locker Capacity	3,900 ft. (1,188 m) of 3.5 in. chain in 4 lockers
Storage Reels	19,879 ft. (6,059 m) of 3 in. wire 2 Storage Reels
Storage Reels	16,923 ft. (5,158 m) of 3.25 in. wire on 2 Storage Reels
Storage Reels	14,601 ft. (4,450 m) of 3.5 in. wire on 2 Storage Reels
Storage Reels	10,000 ft. (3,048 m) of 6.75 in. rope
Storage Reels	8,500 ft. (2,590 m) of 7.25 in. rope

SPECIAL FEATURES

Shark Jaws	Two (2) x 700 MT
Tow Pins	Two (2) x 300 MT
Tuggers	Four (4) x 25 Tons
Ship Motion	Two (2) Passive Type Anti-Roll Tanks
Ship Motion	Bilge Keels
Positioning	DP 2
Stern Rollers	Two (2) x 12 ft. dia. @ 750 MT
Cranes	One (1) Hydramarine HMC 3568 LKO (250-35) (750-20) (1000-15) (1500-10) (100-36)
Cranes	AHC Offshore Marine Knuckle Boom Jib Crane

Cranes	SWL-25 MT @ 35 m/75 MT @ 20 m/100 MT @ 15 m/ 150 MT @ 10 m (1.4 Dynamic) 150 MT Single Line Lift/3,000 m Operating Depth
Cranes	Two (2) x 5-Ton (4.53 MT) Utility Cranes @ 41 ft. (12.5 m) radius
A-Frame	One (1) x 3AMC 300T MK2 (Optional)
Helideck	Modular aluminum construction. Certified for Sikorsky S-92 helicopter. Certified under CAP 437, day or night operations.

ROV

ROV	Two (2) x UltraHeavy-Duty Work Class ROV system (Generation 2)

LIFE SAVING EQUIPMENT

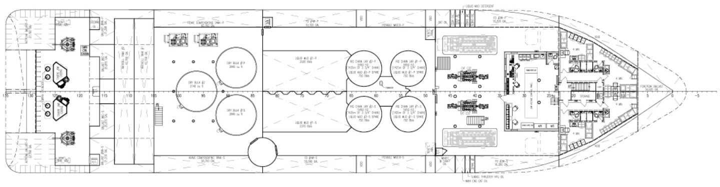
Life Rafts	Six (6) x 25-Man Inflatable Life Rafts
Rescue Boat/Craft	One (1) x Narwhal 4SV-400H SOLAS Rescue Boat with Davit
Other gear as required by authorities	

CLASSIFICATION

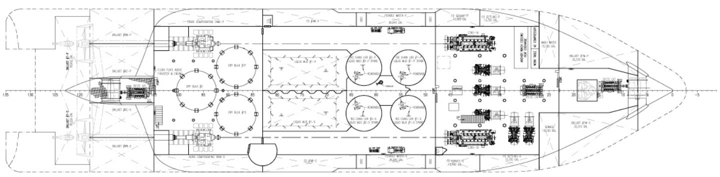
ABS	Maltese Cross A1 (Hull)
ABS	Maltese Cross AMS (Machinery)
ABS	Loadline
ABS	Maltese Cross DPS-2 (Dynamic Positioning)
USCG	Subchapter I/L
SOLAS	
MARPOL	

ACCOMMODATIONS

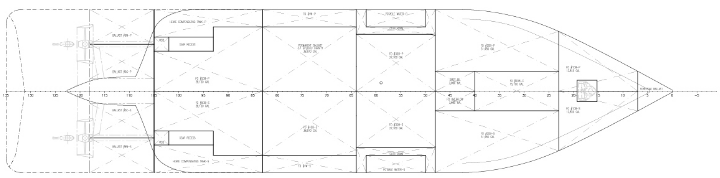
Accommodations	45



LOWER DECK PLAN
1/16"=1'-0"



ABOVE TANK TOP PLAN
1/16"=1'-0"



BELOW TANK TOP PLAN
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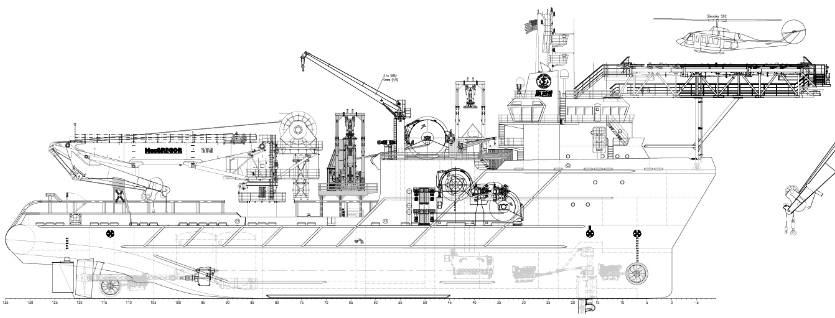

OUTBOARD PROFILE
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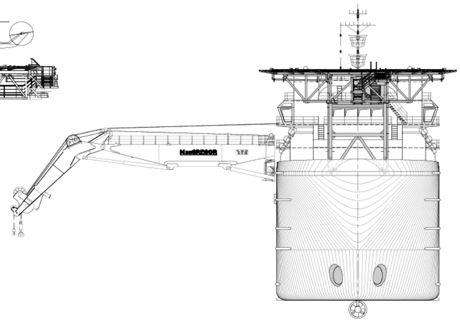
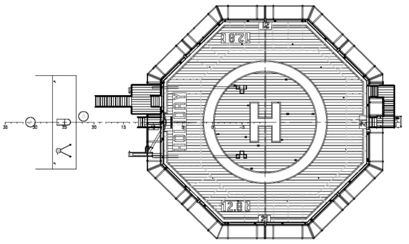


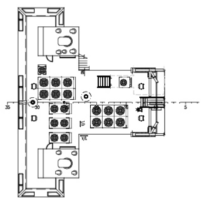
FRONT VIEW

M/V HOLIDAY

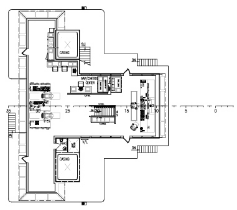
Schematics



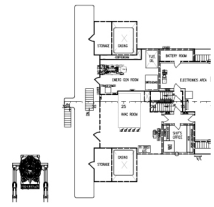
06 DECK PLAN
1/16"=1'-0"



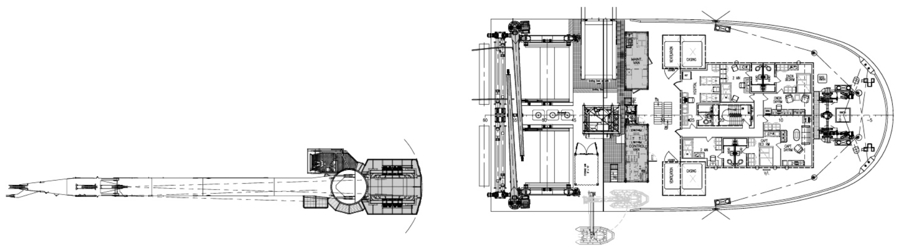
05 DECK PLAN
1/16"=1'-0"



04 DECK PLAN
1/16"=1'-0"



03 DECK PLAN
1/16"=1'-0"



02 DECK PLAN
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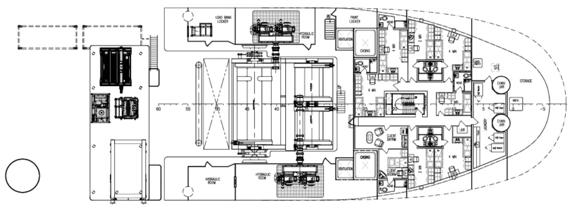
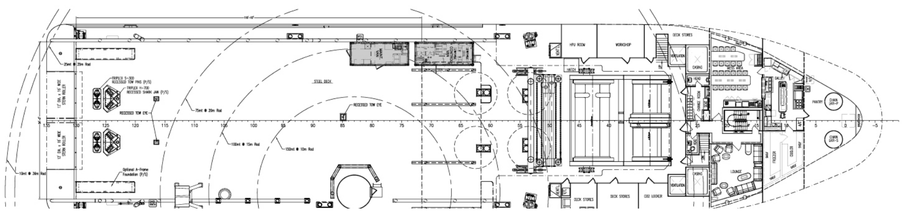


01 DECK PLAN
1/16"=1'-0"



EDISON CHOUEST OFFSHORE
16201 East Main Street
Cut Off, LA 70345-3804
985-601-4444 Fax: 958-632-2282
www.chouest.com

EDISON CHOUEST OFFSHORE

Table 2-13 Main Generating and Propulsion Machinery

Main Engines	6x Wartsila 16V32C, 720rpm, 7680kW
Main Generators	6 x ABB, 11KV, 60Hz, 9312kVA,489A
Emergency Generators	All Main generators are certified to be used as emergency DG's
Main Switchboards	3 x 11kV main switchboards 3 x 440V switchboards aft 2 x 440v switchboard forward 3 x 220V switchboards aft 2 x220V switchboards fwd
Emergency Switchboards	1 x 11kV 1 x 440V 1 x 220V
Azimuth Thrusters	6x Rolls Royce UUC-505, fixed pitch, variable speed, 5.5MW
Main DP Control System	Kongsberg K-Pos DP-32
Back up DP Control System	Kongsberg K-Pos DP-12
Position References and Sensors	3 x DGPS 2 x HiPAP 501 (With one HAIN) 3 x Gyrocompasses 3 x Wind Sensors 3 x MRU's
Independent Joystick	Kongsberg cJoy
Vessel Management System	Kongsberg K-Chief

Attachment 2: Complex Emissions Worksheet

Attachment 2
Complex Total Emissions Worksheet

Attachment 2
Complex Total Emissions Worksheet

COMPANY	BP Exploration & Production Inc.
AREA	Green Canyon
BLOCK	GC743 Unit Agreement #754305003
LEASE	OCS-G 15604 - 15608
FACILITY	Atlantis
WELL	4 Wells
COMPANY CONTACT	Rachel Owen (Air Quality Review)/Catherine Nesbit
TELEPHONE NO.	907-331-9034 /281-896-5128
REMARKS	Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and maintenance.

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:		
YEAR	NUMBER OF PIPELINES	TOTAL NUMBER OF CONSTRUCTION DAYS
2021	see OSC Plan Info Form 0137	314
2022		96
2023		96
2024		96
2025		96
2026		96
2027		96
2028		96
2029		96
2030		96

AIR EMISSIONS COMPUTATION FACTORS

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/chief/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/chief/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/chief/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/chief/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://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	
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	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
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	
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	https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_02-05-18.pdf
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						19.240				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						44.747				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	
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	https://www.epa.gov/moves/nonroad2008a-installation-and-updates
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	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-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	

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		
Density	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	%

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #75430	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/		907-331-9034 /281-896-5128		Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mainte										
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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship	**Average Daily Fuel Usage Maximum Daily Fuel Usage**				**14182 31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.55	47.39	45.97	1.14	1882.11	54.11	0.01	295.20	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	2648.44	2	52	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	1.89	0.05	0.00	0.30	0.00
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	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
Black Hornet	**Average Daily Fuel Usage Maximum Daily Fuel Usage**				**13210 34818**																				
Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V	VESSELS- Drilling / Well Intervention		60354	3104.97189	34818	24	61	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	14.56	8.79	8.52	0.21	348.91	10.03	0.00	54.73	0.10
Egen: Cummins 1900 kW	VESSELS – Drilling Prime Engine, Auxiliary		2458	126.454268	3034.90	2	9	1.73	1.05	1.01	0.03	41.55	1.19	0.00	6.52	0.01	0.02	0.01	0.01	0.00	0.37	0.01	0.00	0.06	0.00
Temporary Large/ Small Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	61	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	1.29	0.78	0.76	0.02	30.93	0.89	0.00	4.85	0.01
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	153	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	35.19	21.23	20.60	0.51	843.18	24.24	0.00	132.25	0.25
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	153	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	3.24	1.95	1.90	0.05	77.58	2.23	0.00	12.17	0.02
Deep Blue	**DP Fuel Usage Transit Fuel Usage**				**8982 17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage Transit Fuel Usage**				**5812 13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	73	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	6.61	3.99	3.87	0.10	158.40	4.55	0.00	24.85	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	42	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.89	0.54	0.52	0.01	21.30	0.61	0.00	3.34	0.01
Siem Stingray	**DP Fuel Usage Transit Fuel Usage**				**3302 15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	48	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	5.12	3.09	3.00	0.07	122.74	3.53	0.00	19.25	0.04
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	48	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	1.02	0.61	0.59	0.01	24.34	0.70	0.00	3.82	0.01
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage Transit Fuel Usage**				**8365 12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	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	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	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	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	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	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	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	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	365	--	--	--	--	--	37.30	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	365	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.65	61.22	--	554.58	--
	COLD VENT				2	24	365	--	--	--	--	--	20.43	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	365	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.75	--	--	--
	GLYCOL DEHYDRATOR				1	24	365	--	--	--	--	--	4.39	--	--	--	--	--	--	--	--	19.24	--	--	--
2021 Facility Total Emissions								**237.05**	**147.08**	**143.17**	**5.21**	**6,328.94**	**255.58**	**0.02**	**1,153.79**	**1.49**	**210.25**	**149.56**	**146.59**	**7.37**	**6,282.72**	**554.02**	**0.02**	**1,677.60**	**1.14**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**					**Modeled Rates**		**---**	**---**	**---**	**---**	**5996.64**	**---**	**---**	**---**	**---**	**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0							**(grey cells excluded from modeling)**																	
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	365	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.25	13.42	13.02	0.32	533.04	15.33	0.00	83.61	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	153	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	9.33	5.63	5.46	0.14	223.44	6.42	0.00	35.05	0.07
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	61	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	3.72	2.24	2.18	0.05	89.08	2.56	0.00	13.97	0.03
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	37	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.26	1.36	1.32	0.03	54.03	1.55	0.00	8.48	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	24	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.46	0.88	0.86	0.02	35.05	1.01	0.00	5.50	0.01
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2021 Non-Facility Total Emissions								**92.04**	**55.53**	**53.87**	**1.34**	**2,205.30**	**63.41**	**0.01**	**345.90**	**0.64**	**74.46**	**44.92**	**43.58**	**1.08**	**1,784.05**	**51.30**	**0.01**	**279.82**	**0.52**

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #75430	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/C		907-331-9034 /281-896-5128		Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai										
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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship or similar	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**14182** **31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.55	47.39	45.97	1.14	1882.11	54.11	0.01	295.20	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	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
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	151	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	34.73	20.95	20.33	0.51	832.15	23.93	0.00	130.52	0.24
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	151	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	3.20	1.93	1.87	0.05	76.57	2.20	0.00	12.01	0.02
Deep Blue	**DP Fuel Usage** **Transit Fuel Usage**				**8982** **17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage** **Transit Fuel Usage**				**5812** **13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	28	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	2.54	1.53	1.48	0.04	60.76	1.75	0.00	9.53	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	28	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.59	0.36	0.35	0.01	14.20	0.41	0.00	2.23	0.00
Siem Stingray	**DP Fuel Usage** **Transit Fuel Usage**				**3302** **15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	14	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	1.49	0.90	0.87	0.02	35.80	1.03	0.00	5.62	0.01
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	14	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.30	0.18	0.17	0.00	7.10	0.20	0.00	1.11	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage** **Transit Fuel Usage**				**8365** **12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	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	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	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	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	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	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	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	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	365	--	--	--	--	--	37.30	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	365	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.65	61.22	--	554.58	--
	COLD VENT				2	24	365	--	--	--	--	--	20.43	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	365	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.75	--	--	--
	GLYCOL DEHYDRATOR				1	24	365	--	--	--	--	--	4.39	--	--	--	--	--	--	--	--	19.24	--	--	--
2022	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.84**	**0.02**	**980.64**	**1.16**	**185.16**	**134.42**	**131.90**	**7.01**	**5,681.58**	**536.73**	**0.02**	**1,583.32**	**0.97**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	365	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.25	13.42	13.02	0.32	533.04	15.33	0.00	83.61	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	151	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	9.20	5.55	5.39	0.13	220.52	6.34	0.00	34.59	0.06
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	14	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.85	0.51	0.50	0.01	20.45	0.59	0.00	3.21	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	7	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.43	0.26	0.25	0.01	10.22	0.29	0.00	1.60	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2022	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**63.31**	**38.20**	**37.05**	**0.92**	**1,516.80**	**43.61**	**0.00**	**237.91**	**0.44**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #75430	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/C		907-331-9034 /281-896-5128		Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai										
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 **(Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)**																									
DRILLING: West Vela Drillship or similar	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**14182** **31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.55	47.39	45.97	1.14	1882.11	54.11	0.01	295.20	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	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
PIPELINE INSTALLATION / SUBSEA INTERVENTION **(Substitution likely with similar vessels of same/lower hourpower)**																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	120	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	27.60	16.65	16.15	0.40	661.31	19.01	0.00	103.73	0.19
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	120	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.54	1.53	1.49	0.04	60.85	1.75	0.00	9.54	0.02
Deep Blue	**DP Fuel Usage** **Transit Fuel Usage**				**8982** **17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage** **Transit Fuel Usage**				**5812** **13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	59	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	5.34	3.22	3.13	0.08	128.03	3.68	0.00	20.08	0.04
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	59	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	1.25	0.75	0.73	0.02	29.92	0.86	0.00	4.69	0.01
Siem Stingray	**DP Fuel Usage** **Transit Fuel Usage**				**3302** **15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	27	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	2.88	1.74	1.69	0.04	69.04	1.99	0.00	10.83	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	27	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.57	0.34	0.33	0.01	13.69	0.39	0.00	2.15	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage** **Transit Fuel Usage**				**8365** **12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	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	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	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	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	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	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	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	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	365	--	--	--	--	--	37.30	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	365	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.65	61.22	--	554.58	--
	COLD VENT				2	24	365	--	--	--	--	--	20.43	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	365	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.75	--	--	--
	GLYCOL DEHYDRATOR				1	24	365	--	--	--	--	--	4.39	--	--	--	--	--	--	--	--	19.24	--	--	--
2023	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.84**	**0.02**	**980.64**	**1.16**	**182.50**	**132.82**	**130.35**	**6.97**	**5,617.84**	**534.90**	**0.01**	**1,573.32**	**0.95**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	365	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.25	13.42	13.02	0.32	533.04	15.33	0.00	83.61	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	120	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	30	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.83	1.10	1.07	0.03	43.81	1.26	0.00	6.87	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	14	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.85	0.51	0.50	0.01	20.45	0.59	0.00	3.21	0.01
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2023	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**62.82**	**37.90**	**36.76**	**0.91**	**1,505.12**	**43.28**	**0.00**	**236.07**	**0.44**

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #754305	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/C		907-331-9034 /281-896-5128		Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai										
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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship or similar	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**14182** **31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	366	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.77	47.52	46.10	1.15	1887.27	54.26	0.01	296.01	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	366	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	7.75	4.67	4.53	0.11	185.59	5.34	0.00	29.11	0.05
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	120	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	27.60	16.65	16.15	0.40	661.31	19.01	0.00	103.73	0.19
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	120	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.54	1.53	1.49	0.04	60.85	1.75	0.00	9.54	0.02
Deep Blue	**DP Fuel Usage** **Transit Fuel Usage**				**8982** **17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage** **Transit Fuel Usage**				**5812** **13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	45	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	4.08	2.46	2.39	0.06	97.65	2.81	0.00	15.32	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	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
Siem Stingray	**DP Fuel Usage** **Transit Fuel Usage**				**3302** **15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	20	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	2.13	1.29	1.25	0.03	51.14	1.47	0.00	8.02	0.01
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	20	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.42	0.26	0.25	0.01	10.14	0.29	0.00	1.59	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage** **Transit Fuel Usage**				**8365** **12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	648.22	24	366	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	5.08	5.08	5.08	0.14	71.68	5.29	--	15.40	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	648.22	24	366	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	5.08	5.08	5.08	0.14	71.68	5.29	--	15.40	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	648.22	24	366	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	5.08	5.08	5.08	0.14	71.68	5.29	--	15.40	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	3086.76	24	366	5.51	5.51	5.51	0.15	77.71	5.73	--	16.70	--	24.21	24.21	24.21	0.68	341.32	25.18	--	73.35	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	366	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.55	2.55	0.76	429.71	2.82	--	110.11	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	366	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.55	2.55	0.76	429.71	2.82	--	110.11	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	366	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.55	2.55	0.76	429.71	2.82	--	110.11	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	366	--	--	--	--	--	37.20	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	366	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.98	61.38	--	556.10	--
	COLD VENT				2	24	366	--	--	--	--	--	20.38	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	366	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.90	--	--	--
	GLYCOL DEHYDRATOR				1	24	366	--	--	--	--	--	4.38	--	--	--	--	--	--	--	--	19.24	--	--	--
2024	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.67**	**0.02**	**980.64**	**1.16**	**180.38**	**131.60**	**129.17**	**6.95**	**5,569.95**	**533.82**	**0.01**	**1,567.71**	**0.93**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	366	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.31	13.46	13.06	0.32	534.50	15.37	0.00	83.84	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	120	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	23	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.40	0.85	0.82	0.02	33.59	0.97	0.00	5.27	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	10	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.61	0.37	0.36	0.01	14.60	0.42	0.00	2.29	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2024	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**62.21**	**37.53**	**36.41**	**0.91**	**1,490.51**	**42.86**	**0.00**	**233.78**	**0.43**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
BP Exploration & Production Inc.	Green Canyon	GC743 Unit Agreement #75430	OCS-G 15604 -	Atlantis	4 Wells	Rachel Owen (Air Quality Review)/	907-331-9034 /281-896-5128	Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai

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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**14182** **31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.55	47.39	45.97	1.14	1882.11	54.11	0.01	295.20	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	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
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	120	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	27.60	16.65	16.15	0.40	661.31	19.01	0.00	103.73	0.19
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	120	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.54	1.53	1.49	0.04	60.85	1.75	0.00	9.54	0.02
Deep Blue	**DP Fuel Usage** **Transit Fuel Usage**				**8982** **17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage** **Transit Fuel Usage**				**5812** **13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	45	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	4.08	2.46	2.39	0.06	97.65	2.81	0.00	15.32	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	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
Siem Stingray	**DP Fuel Usage** **Transit Fuel Usage**				**3302** **15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	20	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	2.13	1.29	1.25	0.03	51.14	1.47	0.00	8.02	0.01
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	20	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.42	0.26	0.25	0.01	10.14	0.29	0.00	1.59	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage** **Transit Fuel Usage**				**8365** **12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	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	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	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	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	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	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	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	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	365	--	--	--	--	--	37.30	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	365	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.65	61.22	--	554.58	--
	COLD VENT				2	24	365	--	--	--	--	--	20.43	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	365	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.75	--	--	--
	GLYCOL DEHYDRATOR				1	24	365	--	--	--	--	--	4.39	--	--	--	--	--	--	--	--	19.24	--	--	--
2025	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.84**	**0.02**	**980.64**	**1.16**	**180.04**	**131.33**	**128.91**	**6.93**	**5,558.91**	**533.21**	**0.01**	**1,564.08**	**0.93**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	365	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.25	13.42	13.02	0.32	533.04	15.33	0.00	83.61	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	120	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	23	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.40	0.85	0.82	0.02	33.59	0.97	0.00	5.27	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	10	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.61	0.37	0.36	0.01	14.60	0.42	0.00	2.29	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2025	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**62.15**	**37.50**	**36.37**	**0.90**	**1,489.05**	**42.81**	**0.00**	**233.55**	**0.43**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #75430	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/C		907-331-9034 /281-896-5128		Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai										
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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**14182** **31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.55	47.39	45.97	1.14	1882.11	54.11	0.01	295.20	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	366	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	7.75	4.67	4.53	0.11	185.59	5.34	0.00	29.11	0.05
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	120	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	27.60	16.65	16.15	0.40	661.31	19.01	0.00	103.73	0.19
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	120	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.54	1.53	1.49	0.04	60.85	1.75	0.00	9.54	0.02
Deep Blue	**DP Fuel Usage** **Transit Fuel Usage**				**8982** **17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage** **Transit Fuel Usage**				**5812** **13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	45	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	4.08	2.46	2.39	0.06	97.65	2.81	0.00	15.32	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	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
Siem Stingray	**DP Fuel Usage** **Transit Fuel Usage**				**3302** **15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	20	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	2.13	1.29	1.25	0.03	51.14	1.47	0.00	8.02	0.01
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	20	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.42	0.26	0.25	0.01	10.14	0.29	0.00	1.59	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage** **Transit Fuel Usage**				**8365** **12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	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	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	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	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	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	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	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	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	365	--	--	--	--	--	37.30	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	365	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.65	61.22	--	554.58	--
	COLD VENT				2	24	365	--	--	--	--	--	20.43	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	365	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.75	--	--	--
	GLYCOL DEHYDRATOR				1	24	365	--	--	--	--	--	4.39	--	--	--	--	--	--	--	--	19.24	--	--	--
2026	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.84**	**0.02**	**980.64**	**1.16**	**180.06**	**131.35**	**128.92**	**6.93**	**5,559.42**	**533.22**	**0.01**	**1,564.16**	**0.93**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	365	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.25	13.42	13.02	0.32	533.04	15.33	0.00	83.61	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	120	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	23	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.40	0.85	0.82	0.02	33.59	0.97	0.00	5.27	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	10	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.61	0.37	0.36	0.01	14.60	0.42	0.00	2.29	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2026	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**62.15**	**37.50**	**36.37**	**0.90**	**1,489.05**	**42.81**	**0.00**	**233.55**	**0.43**

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #754305	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/C		907-331-9034 /281-896-5128		Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai										
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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship	**Average Daily Fuel Usage**				**14182**																				
	Maximum Daily Fuel Usage				**31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.55	47.39	45.97	1.14	1882.11	54.11	0.01	295.20	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	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
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	120	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	27.60	16.65	16.15	0.40	661.31	19.01	0.00	103.73	0.19
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	120	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.54	1.53	1.49	0.04	60.85	1.75	0.00	9.54	0.02
Deep Blue	**DP Fuel Usage**				**8982**																				
	Transit Fuel Usage				**17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage**				**5812**																				
	Transit Fuel Usage				**13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	45	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	4.08	2.46	2.39	0.06	97.65	2.81	0.00	15.32	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	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
Siem Stingray	**DP Fuel Usage**				**3302**																				
	Transit Fuel Usage				**15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	20	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	2.13	1.29	1.25	0.03	51.14	1.47	0.00	8.02	0.01
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	20	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.42	0.26	0.25	0.01	10.14	0.29	0.00	1.59	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage**				**8365**																				
	Transit Fuel Usage				**12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	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	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	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	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	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	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	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	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	365	--	--	--	--	--	37.30	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	365	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.65	61.22	--	554.58	--
	COLD VENT				2	24	365	--	--	--	--	--	20.43	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	365	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.75	--	--	--
	GLYCOL DEHYDRATOR				1	24	365	--	--	--	--	--	4.39	--	--	--	--	--	--	--	--	19.24	--	--	--
2027	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.84**	**0.02**	**980.64**	**1.16**	**180.04**	**131.33**	**128.91**	**6.93**	**5,558.91**	**533.21**	**0.01**	**1,564.08**	**0.93**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	365	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.25	13.42	13.02	0.32	533.04	15.33	0.00	83.61	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	120	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	23	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.40	0.85	0.82	0.02	33.59	0.97	0.00	5.27	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	10	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.61	0.37	0.36	0.01	14.60	0.42	0.00	2.29	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2027	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**62.15**	**37.50**	**36.37**	**0.90**	**1,489.05**	**42.81**	**0.00**	**233.55**	**0.43**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #75430	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/C		907-331-9034 /281-896-5128		Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai										
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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship	**Average Daily Fuel Usage Maximum Daily Fuel Usage**				**14182 31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	366	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.77	47.52	46.10	1.15	1887.27	54.26	0.01	296.01	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	366	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	7.75	4.67	4.53	0.11	185.59	5.34	0.00	29.11	0.05
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	120	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	27.60	16.65	16.15	0.40	661.31	19.01	0.00	103.73	0.19
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	120	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.54	1.53	1.49	0.04	60.85	1.75	0.00	9.54	0.02
Deep Blue	**DP Fuel Usage Transit Fuel Usage**				**8982 17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage Transit Fuel Usage**				**5812 13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	45	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	4.08	2.46	2.39	0.06	97.65	2.81	0.00	15.32	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	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
Siem Stingray	**DP Fuel Usage Transit Fuel Usage**				**3302 15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	20	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	2.13	1.29	1.25	0.03	51.14	1.47	0.00	8.02	0.01
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	20	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.42	0.26	0.25	0.01	10.14	0.29	0.00	1.59	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage Transit Fuel Usage**				**8365 12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	648.22	24	366	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	5.08	5.08	5.08	0.14	71.68	5.29	--	15.40	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	648.22	24	366	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	5.08	5.08	5.08	0.14	71.68	5.29	--	15.40	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	648.22	24	366	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	5.08	5.08	5.08	0.14	71.68	5.29	--	15.40	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	3086.76	24	366	5.51	5.51	5.51	0.15	77.71	5.73	--	16.70	--	24.21	24.21	24.21	0.68	341.32	25.18	--	73.35	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	366	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.55	2.55	0.76	429.71	2.82	--	110.11	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	366	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.55	2.55	0.76	429.71	2.82	--	110.11	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	366	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.55	2.55	0.76	429.71	2.82	--	110.11	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	366	--	--	--	--	--	37.20	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	366	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.98	61.38	--	556.10	--
	COLD VENT				2	24	366	--	--	--	--	--	20.38	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	366	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.90	--	--	--
	GLYCOL DEHYDRATOR				1	24	366	--	--	--	--	--	4.38	--	--	--	--	--	--	--	--	19.24	--	--	--
2028	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.67**	**0.02**	**980.64**	**1.16**	**180.38**	**131.60**	**129.17**	**6.95**	**5,569.95**	**533.82**	**0.01**	**1,567.71**	**0.93**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	366	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.31	13.46	13.06	0.32	534.50	15.37	0.00	83.84	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	120	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	23	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.40	0.85	0.82	0.02	33.59	0.97	0.00	5.27	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	10	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.61	0.37	0.36	0.01	14.60	0.42	0.00	2.29	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2028	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**62.21**	**37.53**	**36.41**	**0.91**	**1,490.51**	**42.86**	**0.00**	**233.78**	**0.43**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #754305	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/C		907-331-9034 /281-896-5128		Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai										
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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**14182** **31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.55	47.39	45.97	1.14	1882.11	54.11	0.01	295.20	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	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
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	120	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	27.60	16.65	16.15	0.40	661.31	19.01	0.00	103.73	0.19
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	120	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.54	1.53	1.49	0.04	60.85	1.75	0.00	9.54	0.02
Deep Blue	**DP Fuel Usage** **Transit Fuel Usage**				**8982** **17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage** **Transit Fuel Usage**				**5812** **13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	45	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	4.08	2.46	2.39	0.06	97.65	2.81	0.00	15.32	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	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
Siem Stingray	**DP Fuel Usage** **Transit Fuel Usage**				**3302** **15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	20	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	2.13	1.29	1.25	0.03	51.14	1.47	0.00	8.02	0.01
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	20	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.42	0.26	0.25	0.01	10.14	0.29	0.00	1.59	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage** **Transit Fuel Usage**				**8365** **12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	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	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	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	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	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	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	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	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	365	--	--	--	--	--	37.30	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	365	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.65	61.22	--	554.58	--
	COLD VENT				2	24	365	--	--	--	--	--	20.43	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	365	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.75	--	--	--
	GLYCOL DEHYDRATOR				1	24	365	--	--	--	--	--	4.39	--	--	--	--	--	--	--	--	19.24	--	--	--
2029	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.84**	**0.02**	**980.64**	**1.16**	**180.04**	**131.33**	**128.91**	**6.93**	**5,558.91**	**533.21**	**0.01**	**1,564.08**	**0.93**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	365	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.25	13.42	13.02	0.32	533.04	15.33	0.00	83.61	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	120	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	23	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.40	0.85	0.82	0.02	33.59	0.97	0.00	5.27	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	10	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.61	0.37	0.36	0.01	14.60	0.42	0.00	2.29	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2029	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**62.15**	**37.50**	**36.37**	**0.90**	**1,489.05**	**42.81**	**0.00**	**233.55**	**0.43**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE	REMARKS											
BP Exploration & Production Inc.	Green Canyon		GC743 Unit Agreement #754305	OCS-G 15604 -	Atlantis	4 Wells					Rachel Owen (Air Quality Review)/C		907-331-9034 /281-896-5128	Supplemental DOCD for the addition of 4 new wells, connection to manifold, umbilical flow lines and other subsea components. Allowance is provided for on-going well intervention and mai											
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 (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)																									
DRILLING: West Vela Drillship	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**14182** **31389**																				
Main Engines: 6 x STX-MAN 16V32/40, 10877 hp ea.	VESSELS- Drilling - Propulsion Engine - Diesel		65262	3357.46886	31389	24	365	46.04	27.78	26.94	0.67	1103.10	31.72	0.00	173.02	0.32	78.55	47.39	45.97	1.14	1882.11	54.11	0.01	295.20	0.55
E-Gen: 1 x Leroy Somer, 2145 hp	VESSELS – Drilling Prime Engine, Auxiliary		2145	110.35167	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
Small/Large Auxiliary Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	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
PIPELINE INSTALLATION / SUBSEA INTERVENTION (Substitution likely with similar vessels of same/lower hourpower)																									
Island Venture (Rigless Well Intervention activity)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Well Intervention		27170	1397.78782	33546.91	24	120	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	27.60	16.65	16.15	0.40	661.31	19.01	0.00	103.73	0.19
Small/Large Aux Engines	VESSELS – Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	120	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.54	1.53	1.49	0.04	60.85	1.75	0.00	9.54	0.02
Deep Blue	**DP Fuel Usage** **Transit Fuel Usage**				**8982** **17700**																				
Deep Blue Main Engines: 45000 hp	VESSELS - Pipeline / Well Intervention		45000	2315.07	17700.00	24	40	31.75	19.15	18.58	0.46	760.62	21.87	0.00	119.30	0.22	4.85	2.93	2.84	0.07	116.31	3.34	0.00	18.24	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	40	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.85	0.51	0.50	0.01	20.28	0.58	0.00	3.18	0.01
Grand Canyon II	**DP Fuel Usage** **Transit Fuel Usage**				**5812** **13209**																				
Grand Canyon II: 6 x 3000 kW (4023 hp each)	VESSELS - Pipeline / Well Intervention		24138	1241.80355	13209.00	24	45	17.03	10.27	9.97	0.25	408.00	11.73	0.00	63.99	0.12	4.08	2.46	2.39	0.06	97.65	2.81	0.00	15.32	0.03
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	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
Siem Stingray	**DP Fuel Usage** **Transit Fuel Usage**				**3302** **15566**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Pipeline / Well Intervention		15448	794.737809	15566.00	24	20	10.90	6.58	6.38	0.16	261.11	7.51	0.00	40.95	0.08	2.13	1.29	1.25	0.03	51.14	1.47	0.00	8.02	0.01
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	20	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.42	0.26	0.25	0.01	10.14	0.29	0.00	1.59	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE (Substitution likely with similar vessels of same/lower hourpower)																									
Q5000	**DP Fuel Usage** **Transit Fuel Usage**				**8365** **12827**																				
Main Engines: 4 x 2880 kW Wartsila	VESSELS - Multi-purpose / Construction		41840	2152.50064	12827.00	24	30	29.52	17.81	17.27	0.43	707.21	20.33	0.00	110.92	0.21	2.64	1.59	1.54	0.04	63.22	1.82	0.00	9.92	0.02
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION																									
Crane 1: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8100 Comp	525	27.00915	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	--
Crane 2: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8110 Prod	525	27.00915	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	--
Crane 3: CAT 3408 DITA 525 hp	RECIP.<600hp Diesel	AT -ZZZ-8120 Gen	525	27.00915	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	--
Ultra High Pressure water Blaster, 275 hp	RECIP.<600hp Diesel		275	14.14765	339.54	24	100	0.61	0.61	0.61	0.02	8.55	0.63	--	1.84	--	0.73	0.73	0.73	0.02	10.26	0.76	--	2.20	--
Air Compressor Ingersoll Rand, HP 935-WCV-T1, 335 hp	RECIP.<600hp Diesel		335	17.23441	413.63	24	100	0.74	0.74	0.74	0.02	10.41	0.77	--	2.24	--	0.89	0.89	0.89	0.02	12.50	0.92	--	2.69	--
Lifeboat x 4: 35.5 hp each	RECIP.<600hp Diesel	LB -01, LB-02, LB-03, LB-04	142	7.30533201	175.33	1	52	0.31	0.31	0.31	0.01	4.41	0.33	--	0.95	--	0.01	0.01	0.01	0.00	0.11	0.01	--	0.02	--
Fast Rescue Craft: 212 hp	RECIP.<600hp Diesel		212	10.906552	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	--
Small/Large Auxiliary Engines	RECIP.<600hp Diesel		2500	128.615	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	--
Fire Water Pump: 3516B, 2691 hp (2007 kW)	RECIP.>600hp Diesel	831-CD-002	2691	138.441186	3322.59	2	52	1.90	1.08	1.06	0.03	64.67	1.72	--	14.83	--	0.10	0.06	0.05	0.00	3.36	0.09	--	0.77	--
Emergency Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-003	2669	137.309374	3295.42	2	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	0.10	0.06	0.05	0.00	3.34	0.09	--	0.76	--
Auxiliary Generator, CAT 3516, 2669 hp	RECIP.>600hp Diesel	831-CD-001	2669	137.309374	3295.42	24	52	1.88	1.07	1.05	0.03	64.14	1.71	--	14.71	--	1.17	0.67	0.65	0.02	40.02	1.06	--	9.18	--
Turbine Generator 1 (ZAN-5000) - diesel	Dual Fuel Turbine	AT-ZAN-5000	30575	1572.96145	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 Generator 2 (ZAN-5030) - diesel	Dual Fuel Turbine	AT-ZAN-5030	30575	1572.96145	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 Generator 3 (ZAN-5060) - diesel	Dual Fuel Turbine	AT-ZAN-5060	30575	1572.96145	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 Generator 1 (ZAN-5000) - nat gas	Natural Gas Turbine	AT-ZAN-5000	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 2 (ZAN-5030) - nat gas	Natural Gas Turbine	AT-ZAN-5030	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
Turbine Generator 3 (ZAN-5060) - nat gas	Natural Gas Turbine	AT-ZAN-5060	30575	218392.857	5241428.57	24	365	--	0.58	0.58	0.17	97.84	0.64	--	25.07	--	--	2.54	2.54	0.76	428.54	2.81	--	109.81	--
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				38	24	365	--	--	--	--	--	37.30	--	--	--	--	--	--	--	--	163.38	--	--	--
	COMBUSTION FLARE - no smoke			388988		24	365	0.00	0.00	0.00	0.22	27.77	13.98	--	126.62	--	0.00	0.00	0.00	0.97	121.65	61.22	--	554.58	--
	COLD VENT				2	24	365	--	--	--	--	--	20.43	--	--	--	--	--	--	--	--	89.49	--	--	--
	FUGITIVES				25000	24	365	--	--	--	--	--	12.50	--	--	--	--	--	--	--	--	54.75	--	--	--
	GLYCOL DEHYDRATOR				1	24	365	--	--	--	--	--	4.39	--	--	--	--	--	--	--	--	19.24	--	--	--
2030	**Facility Total Emissions**							**190.97**	**119.28**	**116.20**	**4.54**	**5,224.99**	**223.84**	**0.02**	**980.64**	**1.16**	**180.04**	**131.33**	**128.91**	**6.93**	**5,558.91**	**533.21**	**0.01**	**1,564.08**	**0.93**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**4,062.60**			**4,062.60**	**4,062.60**	**4,062.60**		**83,634.50**	
	122.0																								
DRILLING - Offshore support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	365	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	22.25	13.42	13.02	0.32	533.04	15.33	0.00	83.61	0.16
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	120	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	40	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.44	1.47	1.43	0.04	58.42	1.68	0.00	9.16	0.02
PIPELINE INSTALLATION / SUBSEA INTERVENTIONS - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	20	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.22	0.74	0.71	0.02	29.21	0.84	0.00	4.58	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	23	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	1.40	0.85	0.82	0.02	33.59	0.97	0.00	5.27	0.01
	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	10	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.61	0.37	0.36	0.01	14.60	0.42	0.00	2.29	0.00
FACILITY INSTALLATION/ CONSTRUCTION/ MAINTENANCE/ MULTI-PURPOSE - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	15	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.91	0.55	0.54	0.01	21.91	0.63	0.00	3.44	0.01
FLOTEL- Island Venture (Substitution likely with similar vessel of same/lower hourpower)																									
4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea.	VESSELS- Flotel		27170	1397.78782	33546.91	24	30	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	6.90	4.16	4.04	0.10	165.33	4.75	0.00	25.93	0.05
Small/Large Aux Engines	VESSELS – Auxiliary		2500	128.615	3086.76	24	30	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00
PRODUCTION - Offshore Support Vessels	VESSELS - Supply Diesel		7200	370.411201	8889.87	24	183	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	11.15	6.73	6.53	0.16	267.25	7.68	0.00	41.92	0.08
2030	**Non-Facility Total Emissions**							**76.81**	**46.34**	**44.95**	**1.12**	**1,840.20**	**52.91**	**0.01**	**288.63**	**0.54**	**62.15**	**37.50**	**36.37**	**0.90**	**1,489.05**	**42.81**	**0.00**	**233.55**	**0.43**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL
BP Exploration & Production Inc.	Green Canyon	GC743 Unit Agreement #754305003	OCS-G 15604 - 15608	Atlantis	4 Wells

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2021	210.25	149.56	146.59	7.37	6282.72	554.02	0.02	1677.60	1.14
2022	185.16	134.42	131.90	7.01	5681.58	536.73	0.02	1583.32	0.97
2023	182.50	132.82	130.35	6.97	5617.84	534.90	0.01	1573.32	0.95
2024	180.38	131.60	129.17	6.95	5569.95	533.82	0.01	1567.71	0.93
2025	180.04	131.33	128.91	6.93	5558.91	533.21	0.01	1564.08	0.93
2026	180.06	131.35	128.92	6.93	5559.42	533.22	0.01	1564.16	0.93
2027	180.04	131.33	128.91	6.93	5558.91	533.21	0.01	1564.08	0.93
2028	180.38	131.60	129.17	6.95	5569.95	533.82	0.01	1567.71	0.93
2029	180.04	131.33	128.91	6.93	5558.91	533.21	0.01	1564.08	0.93
2030	180.04	131.33	128.91	6.93	5558.91	533.21	0.01	1564.08	0.93
Allowable	4062.60			4062.60	4062.60	4062.60		83634.50	

Appendix F: Waste and Water Discharge Information

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:	153	Asset Name:	Stena IceMax
Project Name: DC 104	Projected generated waste	Solid and Liquid Wastes transportation	Waste Disposal			
Type of Waste	Composition	Storage and 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	3,218	bbls/well	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	367.2	bbls/well	Landfill/ Deepwell injection on land
Contaminated Synthetic base mud	SBM interface	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360, Fourchon, LA	400	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	9,282	bbls/well	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	2	tons/well	Recycle
Excess barite	Excess barite from vessel tank cleaning	Barged in (supersacks)	River Birch Landfill, Avondale, LA	N/A	tons/well	Reuse / Landfill
Excess cement	Excess cement from vessel tank cleaning	Barged in (supersacks)	River Birch Landfill, Avondale, LA	12.24	tons/well	Reuse / Landfill
Rig Drilling washwater	Cleaning out of mud tanks	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / RCS, Fourchon LA	2279.7	bbls/well	Landfill/ Deepwell injection on land
Contaminated Completion Fluids	Used Completion fluids	Barged in (15 or 25 barrel cutting boxes)	Ecoserv Fourchon LA	2000	bbls/well	Landfill/ Deepwell injection on land
Completion Fluids	Used Completion fluids	Liquid storage tanks on workboat	Ecoserv / MI Swaco Fourchon LA	6000	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	0.0918	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	45.9	ton/well	Incineration / Landfill
Rig Maintenance Wastes (non hazardous)	Oily rags, pads, oil filters etc.	Barged in (totes)	Omega Waste Management, Patterson, LA	21.42	ton/well	Reuse / Landfill
Rig Used oil	Lube oil, hydraulic oil, glycol	Barged in (drums)	Omega Waste Management, Patterson, LA	9.18	bbls/well	Recycle
Domestic waste	Municipal trash	Barged in (supersacks)	River Birch Landfill, Avondale, LA	3.825	ton/well	Incineration / Landfill
Scrap Metal	scrap piping, grating and other metals	Barged in (scrap baskets)	EMR, Houma, LA	35.19	ton/well	Recycle
Universal Waste	Batteries	Barged in (DOT drums)	Heritage - Rineco, Benton, AR	0.612	ton/well	Recycle
Universal Waste	Fluorescent light bulbs	Barged in (DOT drums)	Heritage - Rineco, Benton, AR	0.153	ton/well	Recycle
Misc. unused chemical	Pills, spacers, additives etc.	Barged in (totes)	River Birch Landfill, Avondale, LA	520.2	bbls/well	Recycle

TABLE 1. ESTIMATED DRILLING AND MODU WASTES DISCHARGED OVERBOARD OFFSHORE GOM

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

Surface Block # 743 **NOI-PF#** 250 **Lat 27° 13' 25.83 N** **Long 90° 1' 55.64 W**

Project Name: Atlantis DC104

Basis: Estimated 145 Drilling Days (95 planned + high side NPT)

All wells slotted to be drilled using Drilling Vessel - **Stena Icemax (DP drillship)**

Type of Waste	Composition	Projected Amount	Projected ocean discharges: Discharge Rate					Discharge	Projected Downhole Disposal ONSHORE: Answer yes or no
Drilling and Completions fluids for Exploration Permits (EP) and Development Permits (DODC).									
Water Based Drilling (WBM) Fluid	Spent drilling fluid drilling riserless hole plus pad mud to fill the hole	50,000 bbl/well	20	days	@	2,500	bbl/day	Seafloor	No
Drill Cuttings wetted with Water Based Fluid	Water base interval	5,000 bbl/well	20	days	@	250	bbl/day	Seafloor	No
Excess Cement Slurry	Excess mixed cement, including additives & waste from equipment wash down after a cement operation	200 bbl/well	7	cmt jobs	@	28.57	bbl/cmt job	Surface	No
Wet Drill Cuttings wetted with Synthetic Based Fluid	unaltered Drill Cuttings and adhering drilling fluid and formation oil carried out from the wellbore with the Drilling Fluid,	3,000 bbl/well	125	days	@	24	bbl/day	Below Water Surface Line	No
Dry Drill Cuttings	Dry Drill cuttings, cement cuttings, & synthetic base mud retained on cuttings residue remaining in the retort vessel after completing the retort procedure.	1,000 bbl/well	125	days	@	8	bbl/day	Cutting Boxes	Yes
Small Volume Drilling Fluid Discharges associated with Cuttings	Displaced interfaces, accumulated solids in sand traps, pit clean-out solids, & centrifuge discharges made while changing the mud weight	1,000 bbl/well	125	days	@	8	bbl/day	Surface	No
Will humans be there? If yes, expect conventional waste									
Domestic Waste / Gray Water	Food waste, drainage from dishwasher, shower, laundry, bath, & washbasin drains	35,917 bbl/well	145	days	@	248	bbl/day	Surface	No
Sanitary Waste	Treated human body waste discharged from toilets & urinals	4,785 bbl/well	145	days	@	33	bbl/day	Surface	No
Is there a deck? If yes, there will be Deck Drainage									
Deck Drainage	Deck washdown & rain water	41,457 bbl/well	145	days	@	286	bbl/day (avg)	Surface	No
Will you conduct well treatment, completion, or workover?									
Well Treatment Fluids	Stimulations fluids including acids, solvents & propping agents	1,600 bbl/well	4	events	@	400	bbl/event	Surface	No
Completion Fluids	Salt solutions, weighted brines, polymers & various additives	1,600 bbl/well	4	events	@	400	bbl/event	Surface	No
Proppants	volumes to be added to Completion fluids	1,600 bbl/well	4	events	@	400	bbl/event	Surface	No
Radioactive Tracers	number of Tracers added to completion fluids	1,600 /well	4	events	@	400	bbl/event	Surface	No
Workover Fluids - **If applicable**	Salt solutions, weighted brines, polymers, & other speciality additives	0 bbl/well	0	events	@	0	bbl/event	Surface	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.									
Desalinization Unit Discharge	Wastewater associated with the process of creating freshwater from seawater	7,223,436 bbl/well	145	days	@	49817	bbl/day	Surface	No
Water Based Mud, Cuttings discharged at the Seafloor	Discharges of muds, cuttings, and cement at the seafloor before installation of the marine rise not listed above	N/A bbl/well	1	events	@	#VALUE!	bbl/event	N/A	N/A
Uncontaminated Ballast Water	Uncontaminated seawater added or removed to maintain proper draft l - no chemicals added for treatment	960,031 bbl/well	145	days	@	6,621	bbl/day (avg)	Surface	No
Uncontaminated Bilge Water	Uncontaminated seawater that collects in the lowest part of the vessel - no chemicals added for treatment	11,006 bbl/well	145	days	@	76	bbl/day (avg)	Surface	N/A
Cement (including cement trace) discharged at seafloor	discharges that occur at the seafloor prior to installation of the marine riser and during marine riser disconnect, well abandonment and plugging operations.	2,000 bbl/well	1	event	@	2000	bbl/day	Seafloor	No
Fire Water	Uncontaminated seawater/freshwater used for fire control l - no chemicals added for treatment	0 bbl/well	145	days	@	0	bbl/week	Surface	No
Cooling Water / Utility Water	Uncontaminated seawater	158,429,277 bbl/well	145	days	@	1,092,616	bbl/day	Surface	No
Chemically Treated Sea Water / Fresh Water	Biocide, corrosion inhibitors, or other chemicals used to prevent corrosion or fouling of drilling fluids piping or auxilalry equipment	1,000 bbl/well	1,000	event	@	1000	bbl/event	Surface	No
Sub Sea Fluid Discharges	Wellhead Preservation, Hydrate Control, Umbilical Steel Tube Storage, Leak Tracer, & Riser Tensioner Fluids	10 bbl/well	10	event	@	10	bbl/event	Seafloor	N/A
Brine and water-based mud discharge at the seafloor for temporary well abandonment	Water based Drilling fluids meets SPP Toxicity and brine that has met limits for free oil, oil and grease concentrations, priority pollutants and toxicity requirements	2,500 bbl/well	2,500	event	@	2500	bbl/event	Seafloor	N/A
Blowout Preventer Fluid - BOP Vent to sea systems only	Fluid used to actuate the hydraulic equipment on the BOP (Erifron 360HD 3% - 97% water)	100 bbl/well	2	event	@	2	bbl/event	Seafloor	N/A
Will you produce hydrocarbons? If yes fill in for produced water.									
Produced Water	Water brought up from hydrocarbon-bearing strata during extraction of oil & gas	0 bbl/well	145	days	@	4,037	bbl/day	Surface	N/A
BP General NPDES permit Number ?		**GMG290110**							

Appendix G: Oil Spill Response Discussion

SPILL RESPONSE DISCUSSION

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

Under this Supplemental Development Operations Coordination Document for the Atlantis DC 104 well, BP Exploration & Production Inc. (BP) proposes to drill a dual zone water injection well to improve pressure support, sweep, and provide stability in the SW for M57 and M55L. The well will tie into an existing PLET at Drill Center 1 with a tree, well jumper, and associated controls.

The uncontrolled blowout scenario is for a potential blowout of the Atlantis DC 104 well which BP calculates has the highest liquid hydrocarbons rate potential in the Green Canyon (GC) 743 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 and worst case discharge (WCD) is approximately 179,400 stbopd, with the calculation support package for this rate attached in the Proprietary Information copy of the Development Operations Coordination Document. The maximum duration of the blowout is estimated at 70 days. The rate profile associated with the well blowout over this 70-day period results in a potential worst case spill volume estimated at 12.56 mmstbo.

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

- Type of Operation: Drilling
- Facility Name: Atlantis DC 104
- Area and Block: Green Canyon Block 743
- Latitude: 27° 13' 25.83” N
- Longitude: 090° 01' 55.64” W
- Distance to Shore: 128.4 statute miles
- Water Depth: 6,837
- API Gravity: 26.9°

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

Description	Barrels of Oil
24 hour uncontrolled blowout	179,400 bbls

Oil spill response-related activities for wells to be drilled under BP’s EP are governed by the BP Regional Oil Spill Response Plan (OSRP). The OSRP was filed on behalf of several BP companies, including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on November 29, 2022. The BP OSRP should meet the requirements contained in 30 CFR Part 254. BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP, according to 30 CFR Part 553 and NTL No. 2008-N05, “Guidelines for Oil Spill Financial Responsibility for Covered Facilities.” The OSRP details BP’s plan for response to manage oil spills that may result from drilling and production operations. BP has designed its response program based on a regional capability of response to spills ranging from small operations-related spills to a worst-case discharge (WCD) from a well blowout. BP’s spill response program is intended to meet the response planning 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 OSRP describes personnel and equipment mobilization, the incident management team organization, and an overview of strategies, actions and notifications to be taken in the event of a spill.

BP will make every effort to respond to the Worst Case Discharge as effectively as practicable. A description of the response equipment to contain and recover the Worst Case Discharge is shown in **Figure 4**, which outlines contracted equipment, personnel, materials and support vessels as well as temporary storage equipment to respond to the

Worst Case Discharge. The list estimates individual times needed for procurement, load out, travel time to the site, and deployment. **Figure 4** also indicates how operations would be supported.

Using the estimated chemical and physical characteristics of crude oil, an ADIOS weathering model was run on a similar product from the ADIOS oil database. The results indicate 24% or approximately 43,056 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 136,344 barrels remaining.

Natural Weathering Data: GC 743, Well DC 104	Barrels of Oil
WCD Volume	179,400
Less 24% natural evaporation/dispersion	43,056
Remaining volume	136,344

4) Land Segment and Resource Identification

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

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

Cameron Parish includes the east side of Sabine Lake, Sabine National Wildlife Refuge, Calcasieu Lake, Lacassine National Wildlife Refuge (inland) and Grand Lake. Cameron Parish also includes the area along the coastline from Sabine Pass to Big Constance Lake in Rockefeller Wildlife Refuge. This region is composed of open public beaches, marshlands and swamps. It serves as a habitat for numerous birds, finfish and other animals, including several rare, threatened and endangered species.

FIGURE 1
TRAJECTORY BY LAND SEGMENT

Conditional probabilities of a spill in Green Canyon Block 743 (GC 743) contacting shoreline segments have been projected utilizing BP's WCD and information in the BOEM Oil Spill Risk Analysis Model (OSRAM) (Ji et al., 2004) for the Central and Western Gulf of Mexico available on the BOEM website using 3, 10, and 30 day impact. The results are tabulated below.

Location	Shoreline Segment	County/Parish, State	Conditional Probability [1](%)		
			3 Day	10 Day	30 day
GC 743, Well DC 104 128.4 statute miles OCS-G: G15607 Launch Area: C 46	C08	Matagorda, TX	--	--	1
	C09	Brazoria, TX	--	--	1
	C10	Galveston, TX	--	--	2
	C12	Jefferson, TX	--	--	1
	C13	**Cameron, LA**	--	--	**3**
	C14	Vermilion, LA	--	--	1
	C17	Terrebonne, LA	--	--	1
	C18	Lafourche, LA	--	--	1
	C20	**Plaquemines, LA**	--	**--**	**3**

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

Figure 2 – Environmental Sensitivities

Plaquemines Parish, Louisiana

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

Areas of Socio-Economic Concern in Plaquemines Parish:

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

- 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

- Shipping Safety Fairways
    - 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

Protection Priorities for Plaquemines Parish:

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

Cameron Parish, Louisiana

Sensitive Areas	Descriptions	Access	Wildlife	Contact
1) CAMERON AREA	On the Calcasieu River and Ship Channel 2.5 miles north of the GOM shoreline. Only route for marine life to enter and/or leave Calcasieu Lake and River Basin.	Take TX Hwy 82 south and then east from Port Arthur to Cameron. Also accessible by boat from the Calcasieu Ship Channel from the GOM. Oil company landings, USCOE facility and helicopter landing/fueling facilities.	**RTE:** **Brown pelican** **Others:** Waterfowl (winter), long-billed curlew, peregrine falcon, marbled godwit, spotted sea trout (breeding), shrimp and blue crab (fall-spring), drum, southern flounder, gulf menhaden (spring-summer)	N/A
2) LOUISIANA GULF COAST AND JOHNSON'S BAYOU	GOM coastline from Louisiana Point (east of Sabine Pass) extending easterly to the west bank of Johnson's Bayou. Primarily composed of marshland and swamps.	Shoreline accessible by shallow draft vessels. Vehicle access is limited to 4-wheel drive vehicles via LA Hwy 82.	**RTE:** **Bald eagle (winter), piping plover (spring-summer)** **Others:** Songbirds (spring), shorebirds, gulls, ruddy duck and other waterfowl (winter), finfish	N/A
3) LOUISIANA GULF COAST MUD LAKE TO WHITE LAKE INLAND TO GIWW	Shoreline on the GOM from Mud Lake to White Lake inland to the GIWW.	LA Hwy 82 parallels the coast about 5 miles from the beach. The beach is marshy salt grass and accessible only by marsh buggy, helicopter or airboat.	**RTE:** **None known** **Others:** Waterfowl (winter), snowy egret, olivaceous cormorant, peregrine falcon, roseate spoonbill, white and brown shrimp, blue crab, finfish	N/A
4) ROCKEFELLER STATE WILDLIFE REFUGE	76,000 acres of brackish to saltwater marshes, shallow lakes and bayous in southwest LA. This area borders the Gulf of Mexico for 26.5 miles and extends inland toward the Grand Chenier ridge, a stranded beach ridge, six miles from the Gulf. Surveys indicate a wintering waterfowl population reaching 160,000.	There are few roads on the refuge. Major access is by small boat, marsh buggy or amphibious vehicle. The best location for a remote command post is at headquarters located on LA Hwy 82 approximately 10 miles east of Grand Chenier, LA. Equipment available: 1 amphibious dragline with 0.5 yard bucket, 1 marsh buggy, small boats, air boats and farm tractors.	**RTE:** **American alligator** **Others:** Egrets and herons (breeding), dabbling ducks (winter), Canada goose and white-fronted goose (winter), peregrine falcon, roseate spoonbill, eastern oyster, menhaden, redfish, flounder, speckled trout, white and brown shrimp and blue crabs (nursery), furbearers (breeding)	Rockefeller SWR 5476 Grand Chenier Hwy Grand Chenier, LA 70643 Phone: (337) 491-2593
5) SABINE WILDLIFE REFUGE	125,000 acres of freshwater and brackish marshes interspersed with low prairie ridges. Calcasieu Lake transects the refuge on the east, and Sabine Lake adjoins it on the west.	By small boat, airboat, amphibious vehicle or marsh buggy. Launching facilities are at Johnson's Bayou landing for the southwest part of the refuge, at refuge headquarters for the west side of Calcasieu Lake, and on the east side of the Cameron Ferry crossing for the east side	**RTE:** **Bald eagle, brown pelican, Kemp's ridley sea turtle** **Others:** Canada goose, white-fronted goose and other waterfowl (winter), peregrine falcon (winter), shrimp, sunfish, bass, spotted sea trout,	Sabine NWR *Physical Location:* 3000 Holly Beach Hwy Hackberry, LA 70645 Phone: (337) 762-3816 *Office Address*: 1428 Highway 27 Bell City, LA 70630 Phone: (337) 598-2216

Sensitive Areas	Descriptions	Access	Wildlife	Contact
		of Calcasieu Lake. Remote command post could be set up at the refuge headquarters. Equipment available: 1 airboat, 4 outboard boats.	southern flounder, blue catfish, red drum, alligator gar, small mammals, snakes	

Areas of Socio-Economic Concern in Cameron Parish:

- Commercial fishing in Sabine Lake area
- Gas field in SNWR just north of Mud Lake
- Gulf States Utilities (GSU) water intake canal at the end of Old River Cove on the north end of Sabine Lake
- Heavy vessel traffic in Lake Charles
- Pleasure Island Marina
- Public beaches and recreational areas (Martin Beach, Gulfview Beach, Holly Peveto Beach, Rutherford Beach)
- Sabine Pass Battleground historical site

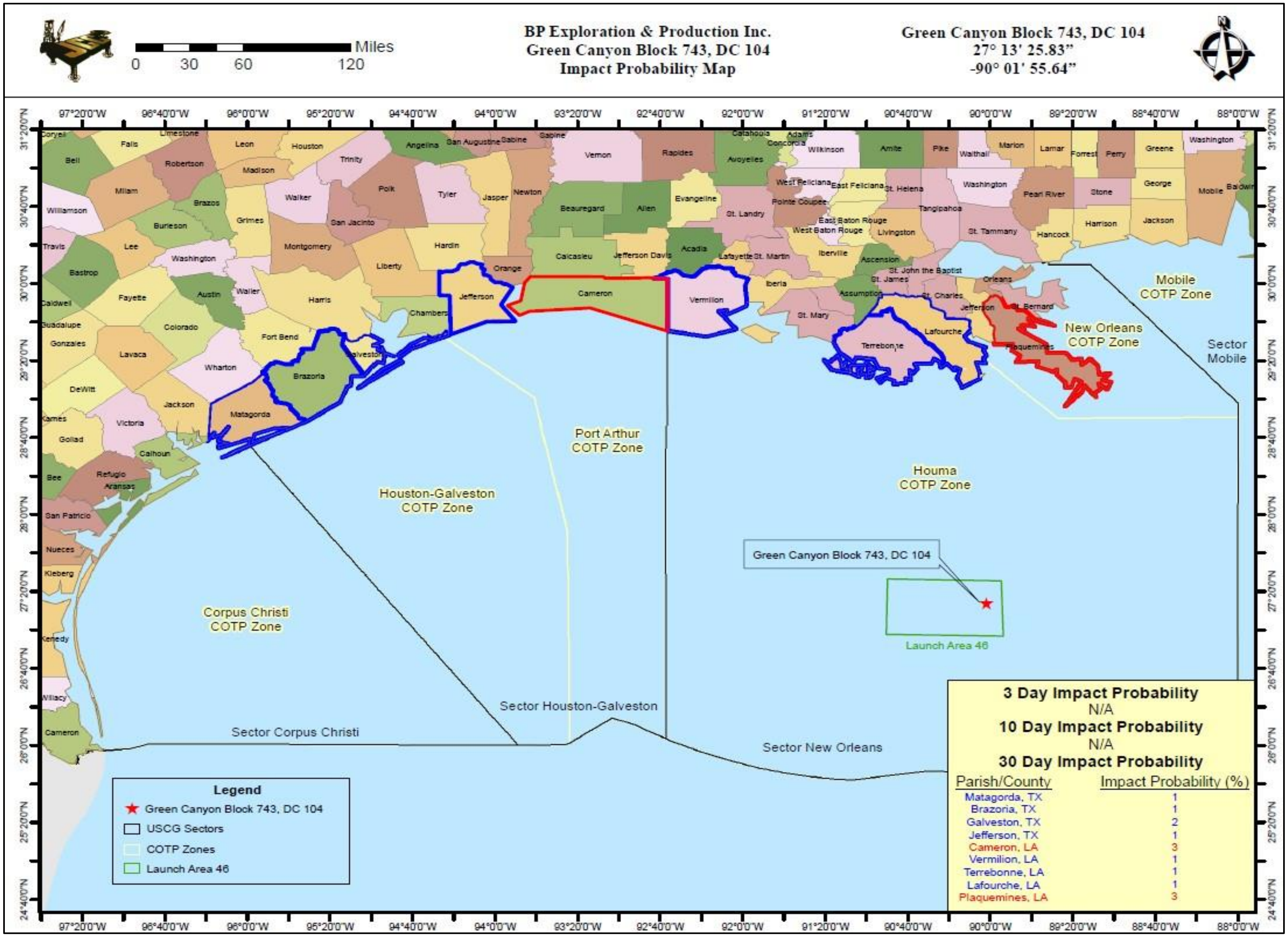
Protection Priorities for Cameron Parish:

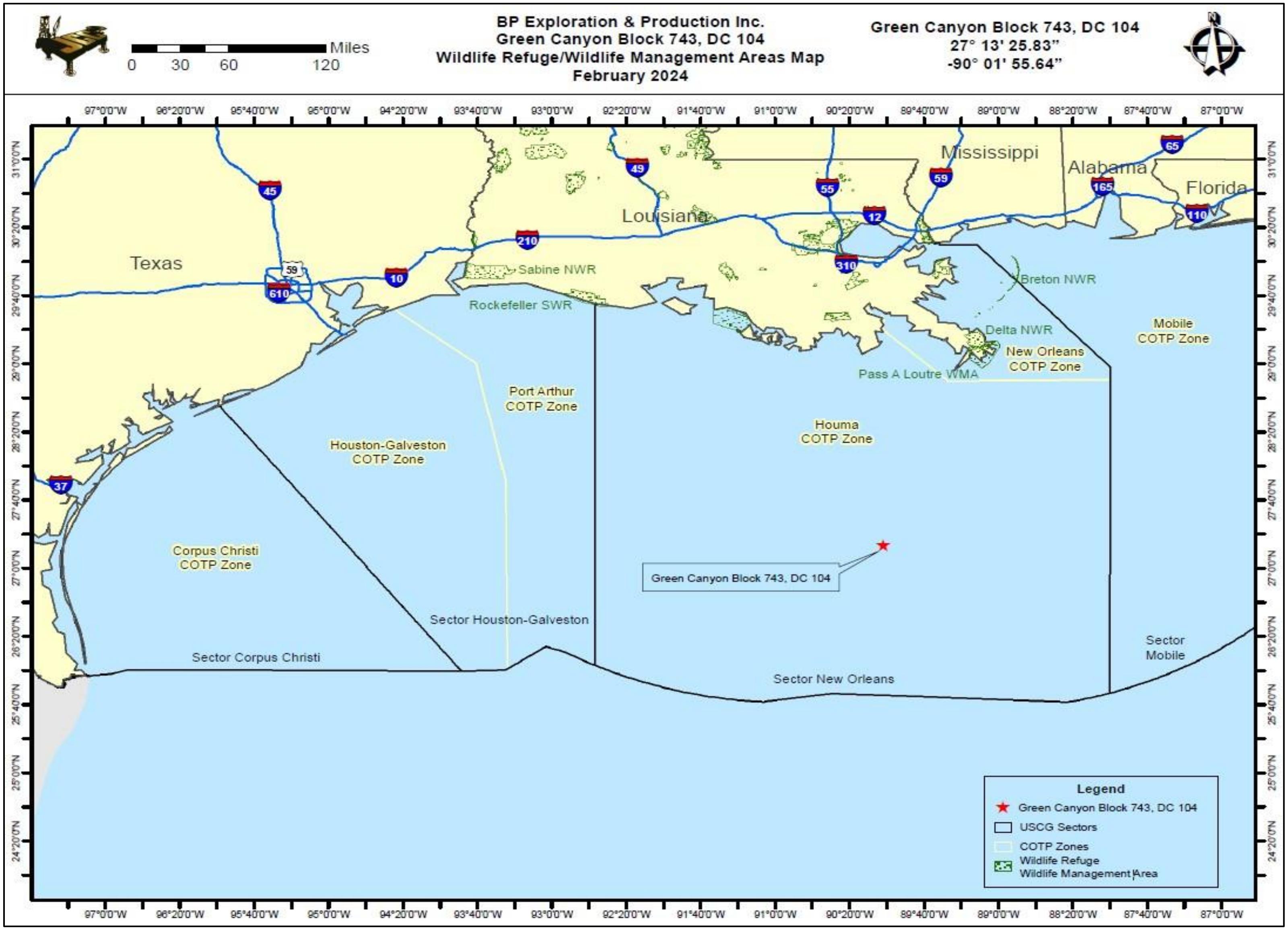
- GSU intake canal
- Rockefeller Wildlife Refuge
- Sabine National Wildlife Refuge
- Other coastal marshlands

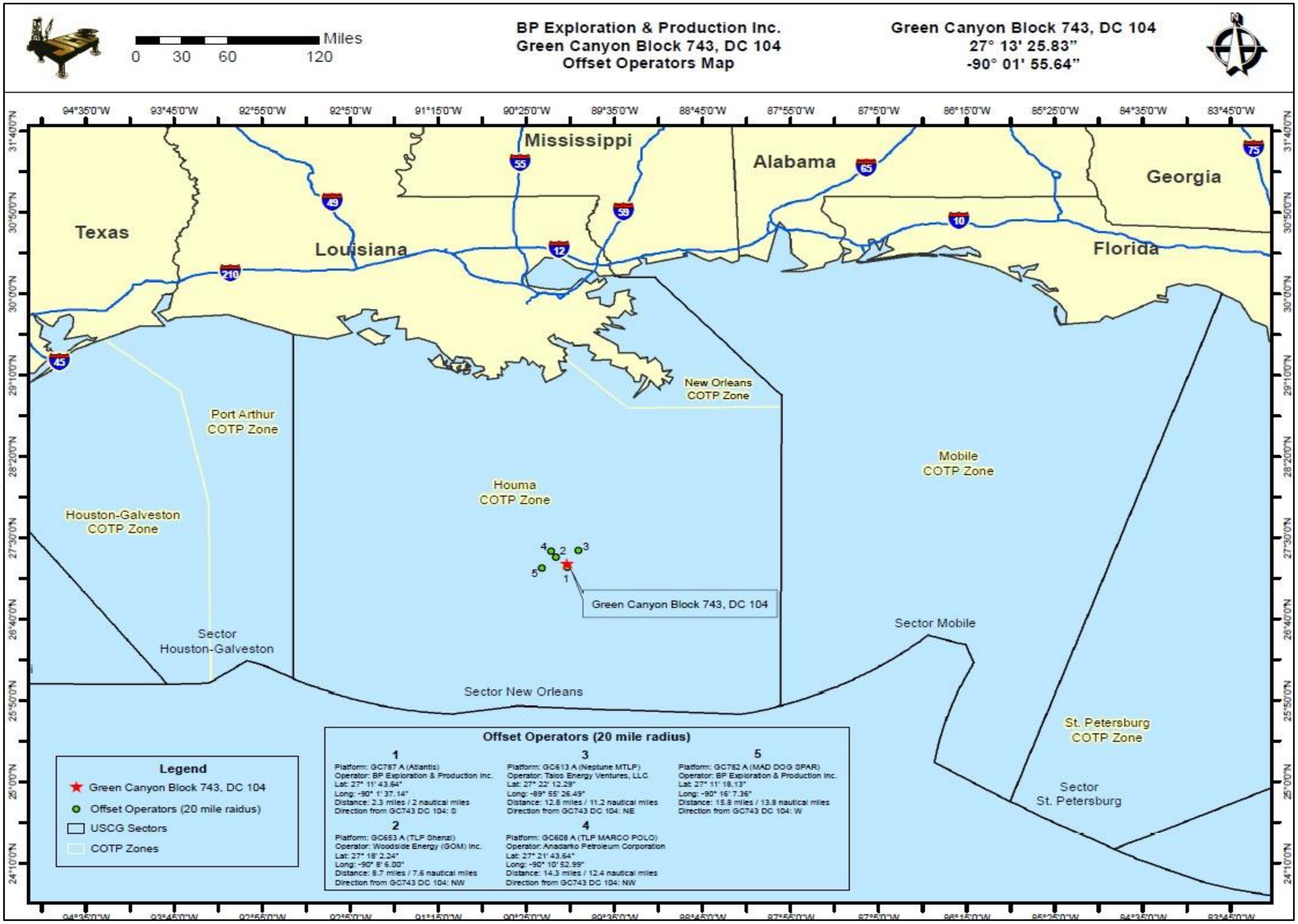
Figure 3

Cameron Parish and Plaquemines Parish – Shorelines

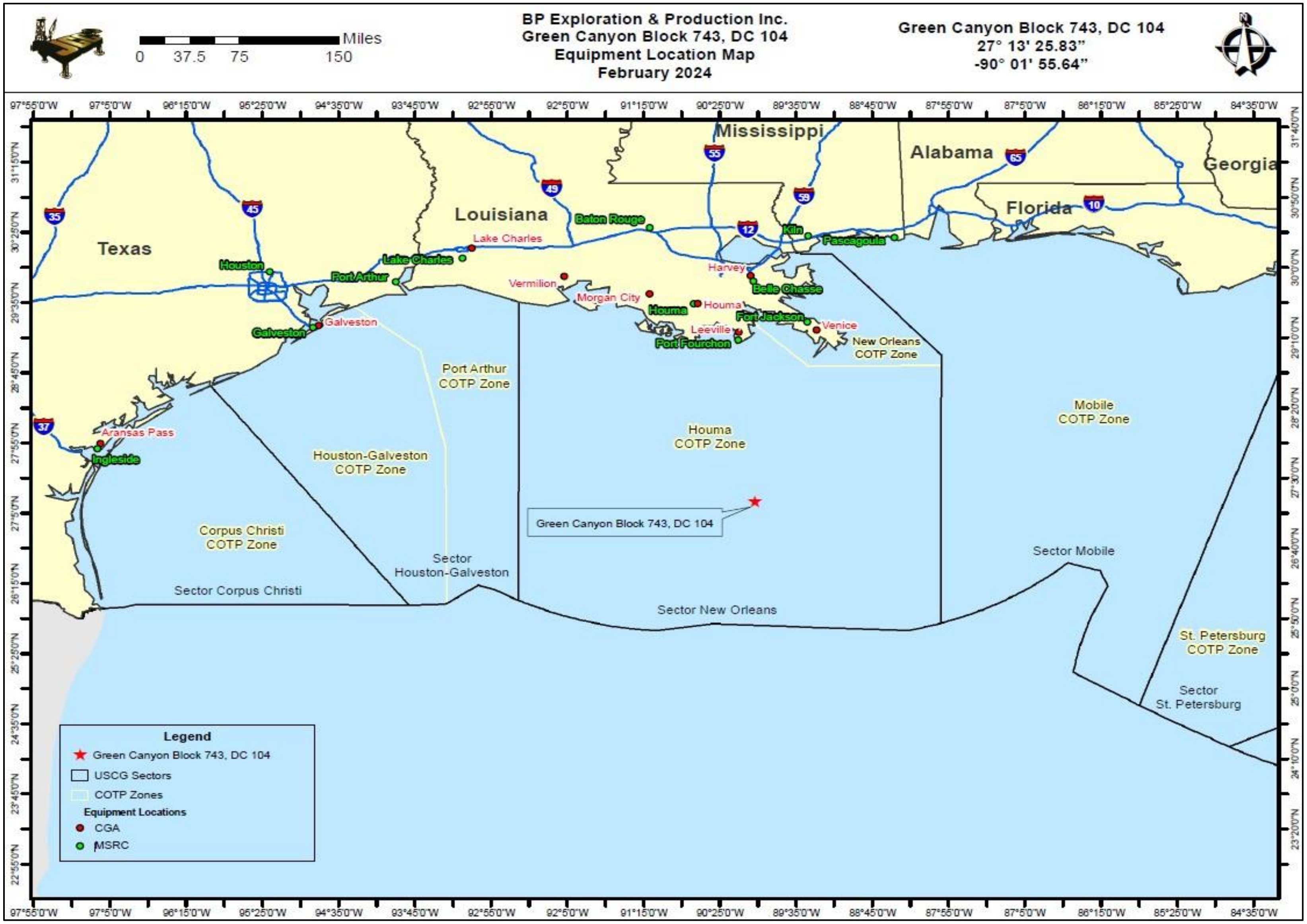
Shoreline Type	Description
Fine Sand Beaches	Beaches with low slopes and a grain-size of 0.625 to 0.200 mm. Low percentage of shells and hash. Major fine sand beaches on the delta plain are found at Southwest Pass, Pelican Island and Chandeleur Island.
Perched Shell Beaches	Shoreline type where a thin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


BP Exploration & Production Inc.
Green Canyon Block 743, DC 104
Impact Probability Map
Green Canyon Block 743, DC 104
27° 13' 25.83"
-90° 01' 55.64"
0 30 60 120 Miles
Houston-Galveston COTP Zone
Port Arthur COTP Zone
Houma COTP Zone
New Orleans COTP Zone
Mobile COTP Zone
Corpus Christi COTP Zone
Sector Mobile
Sector Houston-Galveston
Sector Corpus Christi
Sector New Orleans
Green Canyon Block 743, DC 104
Launch Area 46
Legend
Green Canyon Block 743, DC 104
USCG Sectors
COTP Zones
Launch Area 46
3 Day Impact Probability
N/A
10 Day Impact Probability
N/A
30 Day Impact Probability
Parish/County Impact Probability (%)
Matagorda, TX 1
Brazoria, TX 1
Galveston, TX 2
Jefferson, TX 1
Cameron, LA 3
Vermilion, LA 1
Terrebonne, LA 1
Lafourche, LA 1
Plaquemines, LA 3


BP Exploration & Production Inc.
Green Canyon Block 743, DC 104
Wildlife Refuge/Wildlife Management Areas Map
February 2024
Green Canyon Block 743, DC 104
27° 13' 25.83"
-90° 01' 55.64"
Miles
0 30 60 120
Texas
Louisiana
Mississippi
Alabama
Florida
Sabine NWR
Rockefeller SWR
Breton NWR
Delta NWR
Pass A Loutre WMA
Mobile COTP Zone
New Orleans COTP Zone
Port Arthur COTP Zone
Houma COTP Zone
Houston-Galveston COTP Zone
Corpus Christi COTP Zone
Green Canyon Block 743, DC 104
Sector Houston-Galveston
Sector Corpus Christi
Sector New Orleans
Sector Mobile
Legend
Green Canyon Block 743, DC 104
USCG Sectors
COTP Zones
Wildlife Refuge
Wildlife Management Area



Miles
0 30 60 120
BP Exploration & Production Inc.
Green Canyon Block 743, DC 104
Offset Operators Map
Green Canyon Block 743, DC 104
27° 13' 25.83"
-90° 01' 55.64"
Mississippi
Alabama
Georgia
Texas
Louisiana
Florida
New Orleans COTP Zone
Port Arthur COTP Zone
Mobile COTP Zone
Houma COTP Zone
Houston-Galveston COTP Zone
Green Canyon Block 743, DC 104
Sector Houston-Galveston
Sector Mobile
Sector New Orleans
St. Petersburg COTP Zone
Sector St. Petersburg
Legend
Green Canyon Block 743, DC 104
Offset Operators (20 mile raidus)
USCG Sectors
COTP Zones
Offset Operators (20 mile radius)
1
Platform: GC787 A (Atlantis)
Operator: BP Exploration & Production Inc.
Lat: 27° 11' 43.64"
Long: -90° 1' 37.14"
Distance: 2.3 miles / 2 nautical miles
Direction from GC743 DC 104: S
2
Platform: GC653 A (TLP Shenzi)
Operator: Woodside Energy (GOM) Inc.
Lat: 27° 18' 2.24"
Long: -90° 8' 6.00"
Distance: 8.7 miles / 7.6 nautical miles
Direction from GC743 DC 104: NW
3
Platform: GC613 A (Neptune MTLP)
Operator: Talos Energy Ventures, LLC
Lat: 27° 22' 12.29"
Long: -89° 55' 26.49"
Distance: 12.8 miles / 11.2 nautical miles
Direction from GC743 DC 104: NE
4
Platform: GC608 A (TLP MARCO POLO)
Operator: Anadarko Petroleum Corporation
Lat: 27° 21' 43.64"
Long: -90° 10' 52.99"
Distance: 14.3 miles / 12.4 nautical miles
Direction from GC743 DC 104: NW
5
Platform: GC782 A (MAD DOG SPAR)
Operator: BP Exploration & Production Inc.
Lat: 27° 11' 18.13"
Long: -90° 16' 7.36"
Distance: 15.8 miles / 13.8 nautical miles
Direction from GC743 DC 104: W


Miles
0 37.5 75 150
BP Exploration & Production Inc.
Green Canyon Block 743, DC 104
Equipment Location Map
February 2024
Green Canyon Block 743, DC 104
27° 13' 25.83"
-90° 01' 55.64"
Mississippi
Alabama
Georgia
Louisiana
Florida
Texas
Baton Rouge
Lake Charles
Houston
Lake Charles
Port Arthur
Kiln
Pascagoula
Harvey
Belle Chasse
Vermilion
Morgan City
Houma
Houma
Fort Jackson
Venice
Galveston
Galveston
Leeville
Port Fourchon
New Orleans
COTP Zone
Port Arthur
COTP Zone
Houston-Galveston
COTP Zone
Houma
COTP Zone
Mobile
COTP Zone
Aransas Pass
Ingleside
Corpus Christi
COTP Zone
Green Canyon Block 743, DC 104
Sector
Houston-Galveston
Sector Mobile
Sector Corpus Christi
Sector New Orleans
St. Petersburg
COTP Zone
Sector
St. Petersburg
Legend
Green Canyon Block 743, DC 104
USCG Sectors
COTP Zones
Equipment Locations
CGA
MSRC

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

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

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

6) Location Specific Worst Case Discharge Response

BP's Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If the conditions are favorable for dispersant application and/or in-situ burning, once the proper approvals have been obtained and the proper planning is in place, dispersant application and/or in-situ burning of oil may be employed. Slick containment boom will be immediately called out and on scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA and MSRC spill response equipment, with a total derated skimming capacity of 665,379 barrels. Temporary storage associated with skimming equipment equals 262,496 barrels. If additional storage is needed, various storage barges with a total capacity of 1,088,000+ barrels may be mobilized and centrally located to provide temporary storage and minimize off-loading time. **Safety is first priority. Air monitoring will be conducted, and operations deemed safe prior to the commencement of any containment/skimming operations.**

If the spill went unabated, shoreline impact in Cameron and/or Plaquemines Parish, Louisiana would depend upon existing environmental conditions. Shoreline protection will include the use of CGA and MSRC near shore and shallow water skimmers with a total derated skimming capacity of 292,208 barrels. Temporary storage associated with skimming equipment equals 10,937 barrels. If additional storage is needed, various storage barges with a total capacity of 756,000+ barrels may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Onshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. Contracts with AMPOL and MSRC will ensure access to 98,750 feet of 18" shoreline protection boom. **Figure 4** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies will be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), federal and state agencies that oversee and manage some of the resources that may be at risk, and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. BP's IMT has access to the applicable ACP(s) and GRP(s) Shoreline protection strategies that depict the protection response modes applicable for oil spill clean-up operations. As a secondary resource, the State of Louisiana Initial Oil Spill Response Plan will be consulted as appropriate to provide detailed shoreline protection strategies and describe necessary action to keep the oil spill from entering Louisiana's coastal wetlands. The UC should take into consideration all appropriate items detailed in the Tactics discussion below. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances.

Based on the anticipated worst case discharge scenario, BP can estimate onsite arrival of contracted oil spill recovery equipment with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable, within approximately 62 hours (based on the equipment's Effective Daily Recovery Capacity (EDRC) and expected travel time to spill site).

7) Response Strategies

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

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

In addition, these activities will be monitored by the IMT and UC via a structured COP established to track resource and slick movement in real time.

Offshore Response

Surveillance

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

Dispersant application

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

Dispersant monitoring

- BP will follow and comply with regulatory requirements in 40 CFR 300.913.

Containment boom

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

Dedicated offshore skimming systems

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

Storage Vessels

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

In-situ Burn Assets

- Determine appropriateness of in-situ burning in coordination with the FOSC and affected SOSC.
- Conduct analysis to determine appropriateness of in-situ burn application (refer to Section 19 of approved Oil Spill Response Plan).
- Obtain regulatory approval to conduct in-situ burn operations.
- Determine availability of fire boom and select ignition systems.
- Determine assets to perform on-water operations.
- Build operations into safety plan.
- Initiate orders for additional fire boom stocks required for expected operations.
- Conduct initial test burn to ensure effectiveness.
- Conduct operations in accordance with an approved plan.

Adverse Weather Operations:

During adverse weather conditions, such as seas being greater than three (3) feet, the use of larger recovery and storage vessels, oleophilic skimmers, and large offshore boom will be maximized. Safety will be the overriding factor and operations will cease on the order of the UC or vessel captain. In an emergency, "stop work" may be directed by any crew member.

Near Shore Response Actions

Timing

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

Considerations

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

Surveillance

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

Dispersant Use

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

Shoreline Protection Operations

Response Planning Considerations

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

Placement of boom

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

Beach Preparation Considerations and Actions

- Review SCAT reports and recommendations.
- Monitor tide tables and weather to determine extent of high tides.
- Pre-clean beaches by moving waste/organic matter above high tide lines to minimize waste.
- Determine if it is considered a sensitive area or a critical habitat (i.e turtle nesting grounds).
- Determine logistical requirements of waste removal and disposal.
- Stage equipment and housing of response personnel as close to job site as possible to maximize on-site work time.
- Tend to boom, repair, replace and secure as needed (use of local assets may be advantageous).
- Maintain constant awareness of weather and oil movement for resource re-deployment as necessary.
- Consider earthen berms and shoreline protection boom to protect sensitive inland areas.
- Requisition earth moving equipment.
- Plan for efficient and safe use of personnel, ensuring:
    1. Assessment of remediation requirements, i.e., replacement of sands, rip rap, etc.
    2. Availability of surface washing agents and associated protocol requirements for their use (see National Contingency Plan (NCP) Product Schedule for list of possible agents).
    3. Discussion with all stakeholders, i.e., land owners, refuge/park managers, and others as appropriate, covering the following:
        - Access to areas.

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

Inland and Coastal Marsh Protection and Response Considerations and Actions

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

8) Equipment Limitations

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

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

9) Environmental Conditions in the GOM

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

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

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

WCD Scenario– BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS (128.4 statute miles from shore)
136,344 bbls of crude oil (Volume considering natural weathering, based on 24-hour estimate)
API Gravity 26.9°

FIGURE 4 – Equipment Response Time to GC 743 Well DC 104

Surveillance Aircraft

Dispersant/Surveillance	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI (available through contract with CGA)							
Twin Commander	NA	2	Houma	2	2	0.5	4.5

Dispersant Aircraft

Name/Type	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI (available through contract with CGA)							
Basler 67T	2000	2	Houma, LA	2	2	0.5	4.5
DC 3	1200	2	Houma, LA	2	2	0.8	4.8
DC 3	1200	2	Houma, LA	2	2	0.8	4.8
MSRC							
737 – N735Z	4,125	3	Shenandoah Valley, VA	2	2	2.0	6.0
737 – N735T	4,125	4	Moses Lake, WA	2	2	4.4	8.4

Offshore Response

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
95’ FRV	22885	249	NA	6	Venice, LA	2	0	2	5	1	10
95’ FRV	22885	249	NA	6	Leeville, LA	2	0	2	5	1	10
95’ FRV	22885	249	NA	6	Galveston, TX	2	0	2	12	1	17
95’ FRV	22885	249	NA	6	Vermilion, LA	2	0	2	8	1	13
Boom Barge (CGA-300) 42” Auto Boom (25000’)	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville, LA	8	0	4	10	2	24
HOSS Barge	76285	4000	3 Tugs	8	Harvey, LA	6	0	10	20	2	38

Offshore Response, cont'd.

Offshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
MSRC											
Louisiana Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Fort Jackson, LA	2	1	4	9	1	17
MSRC 401 Offshore Barge 1 Crucial Disk 88/30 2,640' 67" Curtain Pressure Boom	11122	40000	3 Tugs	9	Fort Jackson, LA	4	1	6	18	1	30
S.T. Benz Responder 1 LFF 100 Brush 2,640' 67" Curtain Pressure Boom	18086	4000	NA	11	Grand Isle, LA	3	1	1	10	1	16
Mississippi Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Pascagoula, MS	2	1	2	20	1	26
MSRC 402 Offshore Barge 1 Crucial Disk 88/30 2,640' 67" Curtain Pressure Boom	11122	40300	3 Tugs	9	Pascagoula, MS	4	1	3	28	1	37
Gulf Coast Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Lake Charles, LA	2	1	4	24	1	32
Texas Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Galveston, TX	2	1	1	27	1	32
MSRC 570 Offshore Barge 1 Crucial Disk 88/30 2,640' 67" Curtain Pressure Boom	11122	56900	3 Tugs	9	Galveston, TX	4	1	2	38	1	46
Southern Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Ingleside, TX	2	1	2	35	1	41

MSRC 403 Offshore Barge 1 Crucial Disk 88/30 2,640' 67" Curtain Pressure Boom	11122	40300	3 Tugs	9	Ingleside, TX	4	1	3	50	1	59

Recovered Oil Storage Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia	17	0	6	24	1	48
CTCo 2604	NA	20000	1 Tug	6	Amelia	17	0	6	24	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia	17	0	6	24	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	17	0	6	24	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia	17	0	6	24	1	48

Offshore Recovered Oil Storage Pre-determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Kirby Offshore (available through contract with CGA and/or MSRC)											
RO Barge	NA	80000+	1 Tug	6	Venice	40	0	4	15	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	40	0	4	15	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	40	0	4	15	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	40	0	4	15	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	40	0	4	15	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	40	0	4	15	1	60
RO Barge	NA	130000+	1 Tug	6	Venice	40	0	4	15	1	60
RO Barge	NA	150000+	1 Tug	6	Venice	40	0	4	15	1	60
RO Barge	NA	160000+	1 Tug	6	Venice	40	0	4	15	1	60

Staging Area: Fourchon

Offshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
T&T Marine (available through direct contract with CGA)											
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Harvey	4	12	3	10	2	31
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Galveston	4	12	12	27	2	57
Koseq Skimming Arms (2) Lamor brush	45770	12000	2 OSV	12	Harvey	24	24	3	10	2	62
Koseq Skimming Arms (4) MariFlex 150 HF	72652	24000	4 OSV	24	Harvey	24	24	3	10	2	62
CGA											
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Vermilion	2	5	5.5	10	1	23.5
FRU (3) + 100 bbl Tank (6)	12753	600	3 Utility	18	Leeville	2	5	2	10	1	20
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice	2	5	5	10	1	23
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston	2	5	12	27	1	47
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass	2	5	16.5	31	1	55.5
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Lake Charles	2	5	7	24	1	39

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Baton Rouge	1	1	4	10	1	17
Stress I Skimmer (1)	15840	500	1 Utility	5	Grand Isle	1	1	1	10	1	14
LFF 100 Brush Skimmer (1) 1,320' 67" Curtain Pressure Boom	10567	1000	1 PSV	9	Houma	1	1	2	10	1	15
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Walosep W4 Skimmer (1)	3017	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Foilex 200 Skimmer (1)	1989	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Desmi Skimmer (1)	3017	500	1 Utility	5	Fort Jackson	1	1	5	10	1	18
Stress I Skimmer (1)	15840	500	1 Utility	5	Fort Jackson	1	1	5	10	1	18
Crucial Disk 88/30 Skimmer (1)	11122	1000	1 PSV	9	Fort Jackson	1	1	5	10	1	18

1,320' 67" Curtain Pressure Boom											
Crucial Disk 88/30 Skimmer (1) 1,320' 67" Curtain Pressure Boom	11122	1000	1 PSV	9	Fort Jackson	1	1	5	10	1	18
GT-185 Skimmer (1)	1371	500	1 Utility	5	Pascagoula	1	1	6	10	1	19
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Pascagoula	1	1	6	10	1	19
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Pascagoula	1	1	6	10	1	19
Stress I Skimmer (1)	15840	500	1 Utility	5	Pascagoula	1	1	6	10	1	19
Stress II Skimmer (1)	3017	500	1 Utility	5	Pascagoula	1	1	6	10	1	19
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Galveston	1	1	12	10	1	25
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Galveston	1	1	12	10	1	25
GT-185 Skimmer w Adaptor (2)	2742	1000	2 Utility	10	Galveston	1	1	12	10	1	25
Walosep 4 Skimmer (1)	3017	500	1 Utility	5	Galveston	1	1	12	10	1	25
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Galveston	1	1	12	10	1	25
Stress I Skimmer (1)	15840	500	1 Utility	5	Galveston	1	1	12	10	1	25
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Port Arthur	1	1	8.5	10	1	21.5

Offshore Response, cont'd.

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
CGA											
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	2	10	6	42
MSRC											
67" Curtain Pressure Boom (53570')	NA	NA	80*	160	Houston	1	2	12	10	1	26
1000' Fire Resistant Boom	NA	NA	3*	6	Galveston	1	4	13	10	6	34
16000' Fire Resistant Boom	NA	NA	3*	6	Houston	1	4	12	10	6	33
2000' Hydro Fire Boom	NA	NA	8*	8	Lake Charles	1	4	8	10	6	29

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

Nearshore Response for Plaquemines Parish

Nearshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
Mid-Ship SWS	22885	249	NA	4	Venice	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Morgan City	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Lake Charles	2	0	N/A	48	1	51
46' FRV	15257	65	NA	4	Morgan City	2	0	2	2.5	1	7.5
46' FRV	15257	65	NA	4	Venice	2	0	2	3.5	1	8.5
MSRC											
MSRC Lightning 2 LORI Brush Pack	5000	50	NA	3	Tampa	2	0	1	24	1	28
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2609	NA	23000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48
CTCo 5001	NA	47000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48

Offshore Recovered Oil Storage Pre-determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Kirby Offshore (available through contract with CGA and/or MSRC)											
RO Barge	NA	100000+	1 Tug	6	Venice	45	0	4	10	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	45	0	4	10	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	45	0	4	10	1	60

Staging Area: Fourchon

Nearshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Leeville	2	2	2	2	1	8
SWS Marco	3588	34	NA	3	Leeville	2	2	2	2	1	8
SWS Marco	3588	34	NA	3	Venice	2	2	5	2	1	12
Foilex Skim Package (TDS 150)	1131	50	NA	3	Harvey	4	12	3	2	2	23
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	3	2	1	10
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	3	2	1	10
MSRC											
30 ft. Kvichak Marco I Skimmer	3588	24	NA	2	Belle Chasse	1	1	3	2	1	8
30 ft. Kvichak Marco I Skimmer	3588	24	NA	2	Pascagoula	1	1	6	2	1	11
AardVac Skimmer (1)	3840	500	1 Utility	5	Pascagoula	1	1	6	2	1	11
AardVac Skimmer (2)	7680	1000	2 Utility	10	Miami	1	1	27.5	2	1	32.5
Queensboro Skimmer (5)	4525	2500	5 Pushboat	20	Lake Charles	1	1	7	2	1	12
Queensboro Skimmer (1)	905	500	1 Pushboat	4	Belle Chasse	1	1	3	2	1	8
Queensboro Skimmer (1)	905	400	1 Utility	4	Miami	1	1	5.5	2	1	10.5
WP 1 Skimmer (1)	3017	500	1 Utility	5	Tampa	1	1	21.5	2	1	26.5
WP 1 Skimmer (1)	3017	500	1 Utility	5	Miami	1	1	27.5	2	1	32.5

Shoreline Protection Response for Plaquemines Parish

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Venice	Travel to Deployment Site	Hrs to Deploy	Total Hrs
MSRC									
9,700 feet	5 Crew	10	Lake Charles, LA	1	1	8	2	3	15
100 feet	1 Crew	2	Belle Chasse, LA	1	1	2	2	3	9
6,950 feet	4 Crew	8	Pascagoula, MS	1	1	5	2	3	12
50 feet	1 Crew	2	Tampa, FL	1	1	21	2	3	28
2,950 feet	3 Crew	6	Miami, FL	1	1	27	2	3	34
AMPOL (available through MSA)									
16,000 feet	7 Crew	14	Chalmette, LA	2	2	3	2	6	15
900 feet	1 Crew	2	Morgan City, LA	2	2	3	2	2	11
11,800 feet	5 Crew	10	Gonzales, LA	2	2	5	2	2	13

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	2	1	2	9
Bird Scare Guns (24)	NA	NA	NA	2	Harvey	2	2	2	1	2	9
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	4.5	1	2	11.5

Nearshore Response for Cameron Parish

Nearshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
Mid-Ship SWS	22885	249	NA	4	Leeville	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Galveston	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Vermilion	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Galveston	2	0	N/A	48	1	51
46' FRV	15257	65	NA	4	Aransas Pass	2	0	2	21	1	26
46' FRV	15257	65	NA	4	Lake Charles	2	0	2	7	1	12
MSRC											
MSRC Quick Strike 2 LORI Brush Pack	5000	50	NA	3	Lake Charles	2	0	1	8	1	12
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2605	NA	20000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48
CTCo 2607	NA	23000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48

Offshore Recovered Oil Storage Pre-determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Kirby Offshore (available through contract with CGA and/or MSRC)											
RO Barge	NA	100000+	1 Tug	6	Venice	45	0	4	10	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	45	0	4	10	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	45	0	4	10	1	60

Nearshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Galveston	2	2	12	2	1	19
SWS Marco	3588	20	NA	3	Lake Charles	2	2	7	2	1	14
Foilex Skim Package (TDS 150)	1131	50	NA	3	Lake Charles	4	12	7	2	2	27
Foilex Skim Package (TDS 150)	1131	50	NA	3	Galveston	4	12	11.5	2	2	31.5
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Lake Charles	2	2	7	2	1	14
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Lake Charles	2	2	7	2	1	14
MSRC											
30 ft. Kvichak Marco I Skimmer	3588	24	NA	2	Ingleside	1	1	2	17	1	22
30 ft. Kvichak Marco I Skimmer	3588	24	NA	2	Galveston	1	1	12	2	1	17
AardVac Skimmer (1)	3840	500	1 Utility	5	Lake Charles	1	1	7	2	1	12
Queensboro Skimmer (1)	905	500	1 Pushboat	4	Galveston	1	1	12	2	1	17

Queensboro Skimmer (1)	905	500	1 Pushboat	4	Pascagoula	1	1	6	2	1	11
WP 1 Skimmer (1)	3017	500	1 Utility	5	Pascagoula	1	1	6	2	1	11

Shoreline Protection Response for Cameron Parish

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Fourchon	Travel to Deployment	Hrs to Deploy	Total Hrs
MSRC									
50 feet	1 Crew	2	Port Arthur, TX	1	1	10	2	3	17
150 feet	1 Crew	2	Galveston, TX	1	1	13	2	3	20
50 feet	1 Crew	2	Ingleside, TX	1	1	18	2	3	25
AMPOL (available through MSA)									
34,050 feet	13 Crew	26	New Iberia, LA	2	2	4.1	2	12	22.1
16,000 feet	7 Crew	14	Port Arthur, TX	2	2	9	2	6	21

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	12	1	2	19
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	16.5	1	2	23.5
Bird Scare Guns (48)	NA	NA	NA	2	Lake Charles	2	2	7	1	2	14
MSRC											
Wildlife Rehabilitation	N/A	N/A	N/A	2	Lake Charles, LA	1	2	7	N/A	2	12

Response Asset Totals	Total (bbls)
Offshore EDRC	665,379
Offshore Recovered Oil Storage	1,350,496+
Nearshore / Shallow Water EDRC	292,208
Nearshore / Shallow Water Recovered Oil Storage	766,937+

References

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

Appendix H: CZM Certification - See Section 14

Gulf of Mexico

BP Exploration & Production Inc.

Gulf of Mexico

Supplemental

Development Operations Coordination Document

Appendix H Insert

No updates or changes made to this section when compared to previously submitted Revised DOCD (R-7293) on December 7, 2023.

Appendix I: Environmental Impact Analysis (EIA)

Environmental Impact Analysis

for a

Supplemental Development Operations Coordination Document
for
Green Canyon Block 743 (OCS-G-15607)
Offshore Louisiana

March 2024

Prepared for:

bp Exploration & Production Inc.
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Table of Contents

Table of Contents
(Continued)

Page

List of Tables

List of Figures

Acronyms and Abbreviations

§	section
µPa	micropascal
ac	acre
ADIOS2	Automated Data Inquiry for Oil Spills 2
bbl	barrel
BOEM	Bureau of Ocean Energy Management
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOP	blowout preventer
BOPD	barrels of oil per day
bp	bp Exploration & Production Inc.
BSEE	Bureau of Safety and Environmental Enforcement
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CFR	Code of Federal Regulations
dB	decibel
DP	dynamically positioned
DPS	distinct population segment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIA	Environmental Impact Analysis
EIS	Environmental Impact Statement
EP	Exploration Plan
ESA	Endangered Species Act
FAD	fish aggregating device
FR	*Federal Register*
GC	Green Canyon
GPS	global positioning system
GMFMC	Gulf of Mexico Fishery Management Council
H_2S	hydrogen sulfide
ha	hectare
HAPC	Habitat Area of Particular Concern
Hz	hertz
IPF	impact-producing factor
IMT	Incident Management Team
MARPOL	International Convention for the Prevention of Pollution from Ships
MMC	Marine Mammal Commission
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
NAAQS	National Ambient Air Quality Standards
NH_3	ammonia
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRDA	Natural Resource Damage Assessment
NTL	Notice to Lessees and Operators
NWR	National Wildlife Refuge
OCS	Outer Continental Shelf
OSRA	Oil Spill Risk Analysis
PAH	polycyclic aromatic hydrocarbons
Pb	lead
PK	zero-to-peak sound pressure level
PM	particulate matter
PSD	Prevention of Significant Deterioration
re	referenced to
ROSRP	Regional Oil Spill Response Plan
SBM	synthetic-based drilling muds
SEL_{24h}	sound exposure level over 24 hours
SEMS	Safety and Environmental Management system
SO_x	sulfur oxides
SPL	root-mean-square sound pressure level
SWSS	Sperm Whale Seismic Study
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WCD	worst case discharge

Introduction

BP Exploration & Production Inc. (bp) is submitting a Supplemental Development Operations Coordination Document (DOCD) for Green Canyon (GC) Block 743 (GC 743). Under this DOCD, bp proposes to drill one well with a surface location in GC 743. The primary well location also has an alternate mirror location which is included only for re-spud purposes. This mirror location ultimately targets the same production horizon and will encounter the same sands on the path to the targeted bottom-hole location as their respective primary well. The DOCD also covers the installation of a new jumper, one steel tube flying lead, three electrical flying leads, and commissioning the well. The Environmental Impact Analysis (EIA) provides information on potential impacts to environmental, archaeological, and socioeconomic resources that could be affected by bp's proposed activities in the project area under this DOCD. Due to the well's surface location in GC 743, this will be used as the reference point for the source of potential environmental impacts.

GC 743 is located within the Central Gulf of Mexico OCS Planning Area, approximately 121 statute miles (195 kilometers [km]) from the nearest shoreline (Plaquemines Parish, Louisiana), 129 statute miles (208 km) from the regional onshore support base (Port Fourchon, Louisiana), and 166 statute miles (267 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the proposed project location is approximately 2,081 m (6,828 ft). A dynamically positioned (DP) drillship is anticipated to be on site for 73 days for well drilling and completion activities. Installation of seafloor infrastructure will require additional days on site by installation vessels.

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 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 Bureau of Ocean Energy Management, 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 2024-2029 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; 2014a; 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; 2014a; 2015; 2016b; 2017). The National Marine Fisheries Service (NMFS) Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico assesses impacts and requires additional mitigation measures for protected species (NMFS, 2020a). The analyses and relevant information from those documents are incorporated in this EIA by reference.

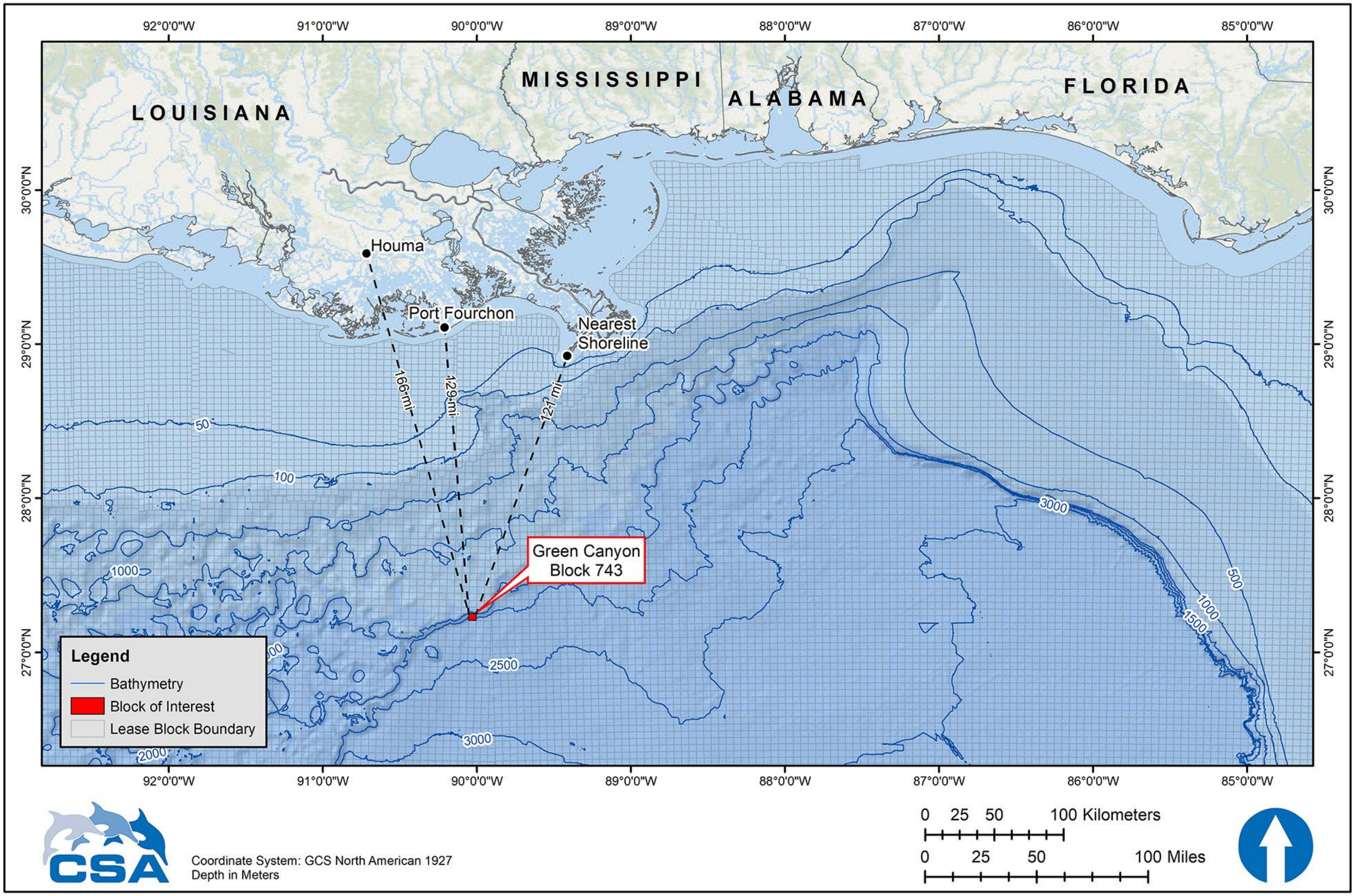

Figure 1. Location of Green Canyon Block 743 relative to the Louisiana shoreline and offshore bathymetric contours.

Oil spill response-related activities for the well to be drilled under 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 10 April 2023. The ROSRP was filed 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 30 May 2023. 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 with a designed 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.

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

NTL	Title	Summary
BOEM-2023-G01	Expanded Rice's Whale Protection Efforts During Reinitiated Consultation with NMFS	Provides recommendations and guidance for operators for suggested measures to expand protections for the Rice's whale while BOEM and BSEE are involved in consultation with NMFS on the amended 2020 Biological Opinion. The NTL guidance applies to the Expanded Rice's Whale Area, comprising the entire northern Gulf of Mexico between the 100 and 400 m isobaths.
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 May 5, 2008.
BOEM-2016-G01 or Appendix C (NMFS, 2020a, 2021a)	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 colliding with protected species; and requires operators to report sightings of any injured or dead protected species. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.

Table 1. (Continued).

NTL	Title	Summary
BOEM-2016-G02 or Appendix A (NMFS, 2020a)	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. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.
2015-G03 or Appendix B (NMFS 2020a)	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 (WCD) and Blowout Scenarios	Provides guidance regarding information required in WCD descriptions and blowout scenarios.
BOEM 2014-G04	Military Warning and Water Test Areas	Provides contact links to individual command headquarters for the military warning and water test areas in the Gulf of Mexico.
BSEE 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.
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 *Federal Register* [FR] 63346). Informs operators that BOEM 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.

Table 1. (Continued).

NTL	Title	Summary
2009-G40	Deepwater Benthic Communities	Provides guidance for avoiding and protecting high-density deepwater benthic communities (including chemosynthetic and deepwater coral communities) from damage caused by OCS oil and gas activities in water depths greater than 300 m (984 ft). Prescribes separation distances of 610 m (2,000 ft) from each mud and cuttings discharge location and 76 m (250 ft) from all other seafloor disturbances.
2009-G39	Biologically Sensitive Underwater Features and Areas	Provides guidance for avoiding and protecting biologically sensitive features and areas (i.e., topographic features, pinnacles, low relief live bottom areas, and other potentially sensitive biological features) when conducting OCS operations in water depths less than 300 m (984 ft) in the Gulf of Mexico.
2008-G04	Information Requirements for Exploration Plans and Development Operations Coordination Documents	Provides guidance on information requirements for OCS plans, including EIA requirements and information regarding compliance with the provisions of the Endangered Species Act and Marine Mammal Protection Act.
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 Mexico 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. Reissued in June 2020 to comply with Executive Order 13891 of 9 October 2019 and to rescind NTL 2011-JOINT-G01.

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 as presented in **Table 2**. **Table 2** provides a matrix of environmental resources that may be affected in the left column and sources of impacts (i.e., IPFs) 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 (**Table 2**). Where there may be an effect, an impact analysis by resource is provided in **Section C**. Potential IPFs for the proposed activities are listed below and briefly discussed in the following sections:

- Drilling rig and 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 Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

The activities proposed in this DOCD will be completed using a DP drillship and DP installation vessels. DP vessels use a global positioning system (GPS), specific computer software, and sensors in conjunction with a series of thrusters to maintain position. Through satellite navigation and position reference sensors, the location of the drilling rig is precisely monitored while thrusters, positioned at various locations about the rig pontoons, are activated to maintain position. This allows operations at sea in areas where mooring or anchoring may not best suited or feasible. Consequently, there will be no anchoring during this project. The selected drilling rig is expected to be on site for approximately 73 days, with additional time needed by installation vessels for equipment installation. The drilling rig and installation vessels will maintain exterior lighting in accordance with applicable federal navigation and aviation safety regulations (International Regulations for Preventing Collisions at Sea, 1972 [72 COLREGS], Part C).

Potential impacts to marine resources from the drilling rig and installation vessels include the physical presence of the vessels in the ocean, entanglement and entrapment from moon pools and equipment in the water, working and safety lighting, and underwater sound produced during drilling and installation operations.

During the physical presence of the drilling rig, drilling associated activities, the installation vessels, and installation associated activities, there may be occasions where equipment may be suspended in the water column. Entanglement and entrapment of protected species can occur from equipment 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 lines in the water by encasing flexible lines, removing excess lines, and keeping lines taught to remove slack and line loops.

Table 2. Matrix of impact-producing factors (IPF) and affected environmental resources.

Environmental Resources	Impact-producing Factors									
	Drilling Rig and Installation Vessel Presence (incl. sound & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marin e 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**	--	--	--	--	--	**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	**X**	--	--	--	--	--	--	**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**(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)
Threatened coral	--	--	--	--	--	--	--	--	--	**X**(6)

Table 2. (Continued).

Environmental Resources	Impact-producing Factors									
	Drilling Rig and Installation Vessel Presence (incl. sound & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marin e Debris	Support Vessel/ Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
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)

*Numbers refer to table footnotes.
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) *3-mile zone of the Flower Garden Banks, or the 4-mile zone of East and West Flower Garden Bank;*
   (b) *1,000-m, 1-mile, or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an Outer Continental Shelf (OCS) lease;*
   (c) *Essential Fish Habitat (EFH) criteria of 152 m (500 ft) from any no-activity zone; or*
   (d) *Proximity of any submarine bank (152 m [500-ft] buffer zone) with relief greater than 2 m (7 ft) that is not protected by the Topographic Features Stipulation attached to an OCS lease.*
      - None of these conditions (a through d) are applicable. The project area is not within or near any marine sanctuary, topographic feature, submarine bank, or no-activity zone.

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

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

(4) *Activities on blocks designated by the BOEM as being in water depths 400 m or greater.*
   - No impacts on high-density deepwater benthic communities are anticipated. There is a negligible potential for the presence of high-density chemosynthetic communities or coral communities within 610 m (2,000 ft) of the proposed activities locations (bp, 2023).

(5) *Exploration or production activities where Hydrogen Sulfide (H_2S) concentrations greater than 500 ppm might be encountered.*
   - GC 743 is classified as H_2S Absent. See DOCD Section 4 for H_2S management information.

(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. An archaeological assessment determined that no sonar contacts are recommended for investigation or avoidance based on archaeological potential (bp, 2023).

(8) *All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.*
   - IPFs that may affect marine mammals, sea turtles, or their critical habitats include drilling rig and 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.

The physical presence of the drilling rig and installation vessels in the ocean can attract and potentially impact pelagic marine resources, as discussed in **Section C.5.1**. Offshore 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. Drilling and installation operations produce underwater sounds that may impact certain marine resources. Sources of drilling-related sounds include, for example, riser rotation, DP thrusters, remotely operated vehicle (ROV) operations, and seabed mounted active acoustics (such as ultra-short baseline systems) for positioning. Of the aforementioned sources, only DP thruster activity is expected to produce sound at levels which could result in potential impacts on marine life.

Drilling and installation operations can be expected to produce sound associated with propulsion machinery that transmits directly to the water during station keeping, drilling, and maintenance operations. Additional sound and vibration are transmitted through the hull to the water from auxiliary machinery, such as generators, pumps, and compressors onboard the drilling rig (Richardson et al., 1995). The sound 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, vessel thruster specifications, and operational requirements. Representative source levels for vessels in DP mode range from 184 to 190 decibels (dB) referenced to (re) 1 micropascal (µPa) m with a primary frequency below 600 Hz (Blackwell and Greene Jr., 2003; McKenna et al., 2012; Kyhn et al., 2014). Zykov (2016) characterized a noisier drillship thruster with a source level, expressed as root-mean-square sound pressure level (SPL), of 190 to 195 dB re 1 µPa m. The source level for the thrusters used by Zykov (2016) were estimated for power output close to the nominal value (the maximum sustainable) for all thrusters; it is highly unlikely that all the thrusters of all vessels will be operated at such conditions for a prolonged period of time.

Drilling operations produce sound that includes strong tonal components at low frequencies. When drilling, the drill string represents a long vertical sound source (McCauley, 1998). Source levels associated with drilling activities have a maximum broadband (10 Hz to 10 kHz) energy of approximately 190 dB re 1 µPa m (Hildebrand, 2005). Based on available data, source levels generated from drillships during drilling and in the absence of thrusters can be expected to range between 154 and 176 dB re 1 µPa m (Nedwell et al., 2001). The use of thrusters, whether drilling or not, can elevate sound source levels from a drillship or semisubmersible to approximately 188 dB re 1 µPa m (Nedwell and Howell, 2004).

Positioning of the drilling rig requires the use of a vessel-mounted transducer and a series of transceivers placed on the seafloor. The transducer employs a high frequency acoustic signal (i.e., main energy between 21 and 31 kHz) throughout the operation. While the acoustic signal emitted by the transducer is similar to that emitted by a commercial echosounder, its source level will vary depending upon water depth (i.e., higher source levels required in deeper water). Source levels for the vessel-mounted transceiver, expressed as SPL, are estimated to be >200 dB re 1 µPa m, with the energy focused towards the seafloor (Equinor, 2019). The directionality and frequency of the source results in minimal propagation outside the main beam of the pulse.

The response of marine mammals, sea turtles, and fishes to a perceived marine sound depends on a range of factors, including 1) SPL, frequency, duration, and novelty of the sound; 2) the physical and behavioral state of the animal at the time of perception; and 3) the ambient acoustic features of the environment (Hildebrand, 2009). Additionally, the sound detection capabilities of a particular species or group of species can make them more or less susceptible to potential impacts from sound sources (BOEM, 2014b).

A.2 Physical Disturbance to the Seafloor

In water depths of 600 m (1,969 ft) or greater, DP drilling rigs disturb only a very small area of the seafloor around the wellbore where the bottom template and blowout preventer (BOP) are located. Depending on the specific well configuration, the total disturbed area is estimated to be 0.25 hectares (ha) (0.62 acres [ac]) per well (BOEM, 2012a). Additional areas of seafloor disturbance will occur where the jumper, steel tube flying lead, and electrical flying leads are placed on the seafloor. It is expected these areas of disturbance will be limited to the immediate vicinity of the installed equipment.

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 and DOCD Appendix E. The primary air pollutants typically associated with OCS activities are suspended particulate matter ($PM_{2.5}$ and PM_{10}), sulfur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO) (Reşitoğlu et al., 2015), as well as ammonia (NH_3) and lead (Pb) per NTL BOEM-2020-G01. These emissions occur mainly from combustion diesel and aviation fuel, also known as Jet-A.

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 7.2 and DOCD Appendix F. 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) Region 6 and any applicable U.S. Coast Guard (USCG) regulations such as International Sewage Pollution Prevention Certificates and maintenance logs/records for marine sanitation devices.

Water-based drilling muds and cuttings are expected to be released at the seafloor during the initial well-drilling intervals before the marine riser that enables the return of drilling muds and cuttings to the surface is installed and set. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Blowout prevention fluids also are expected to be discharged during the setting of the BOP, diverter systems testing after drilling fluids displacement, and at regular testing intervals per the NPDES permit. Drill cuttings generated during synthetic-based drilling mud (SBM) operations will be collected on the rig in dry cuttings boxes. SBM will either be reused by the vendor on the rig or transported via bulk tank containers to Port Fourchon, Louisiana, for recycling and/or disposal at an approved facility. Drill cuttings wetted with some residual SBMs will be discharged at the surface in accordance with the Base Fluids Retained on Cuttings (RoC %) percentage as listed in NPDES permit conditions averaged over all well sections. Dry cuttings are sent ashore in cutting boxes for disposal at approved facilities. Well treatment fluids, well completion fluids, well workover fluids, residual drilling fluids adhered to marine risers and minor drips/splatters around mud and solids control equipment also are expected to be contained, handled or discharged in accordance with the specified conditions, terms, or limitations in the NPDES permit.

Drilling fluids or cuttings will not be discharged when they fail the static sheen test defined in Appendix 1 of 40 CFR 435, Subpart A.

Other marine vessel effluent discharges are expected from drilling and installation activities are expected to be discharged in accordance with the conditions in the NPDES permit or USCG regulations (33 CFR 151.51-151.79 and 33 CFR 159) that pertain to MARPOL 73/78 Annex IV & V. These marine operations effluents include miscellaneous discharges that are untreated, effluents that are treated before discharge, and substances removed during wastewater control. Miscellaneous discharges will consist of uncontaminated seawater/freshwater, such as uncontaminated ballast/bilge water, fire water, cooling water, potable water, graywater from dishwater, shower, laundry, bath, and washbasin drains, off-specification potable water and desalination unit discharge. Chemically treated effluents include seawater/freshwater to which treatment chemicals such as biocides or corrosion inhibitors have been added, sewage processed through a marine sanitation device, and deck drainage effluents passed through the drillship oil-water separator. Removed substances and include, but are not limited to, solids, sewage sludges, filter backwash, and other pollutants removed from wastewater removed in the course of treatment or wastewater control shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

Waste streams will not be discharged that contain free oil as evidenced by the monitoring method specified for that particular stream, e.g., deck drainage or miscellaneous discharges will not be discharged when they would cause a film or sheen upon or discoloration of the surface of the receiving water.

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

A.5 Water Intake

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery. Section 316(b) of the Clean Water Act requires NPDES permits to ensure that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available to minimize adverse environmental impact from impingement and entrainment of aquatic organisms. The General NPDES Permit specifies design requirements for facilities for which construction commenced after 17 July 2006 with a cooling water intake structure having a design intake capacity of greater than two million gallons of water per day, of which at least 25% is used for cooling purposes. It is expected that the drilling rig and installation vessels ultimately selected for this project will be in compliance with all applicable cooling water intake structure design requirements, monitoring, and limitations. Where applicable, the drilling rig and installation vessel operators take 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 and Appendix F. Wastes generated during the proposed project are expected to be properly stored and segregated on the drilling rig and installation vessels. Wastes are 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 or negligible impacts.

A.7 Marine Debris

All activities of bp and its contractors relating to solid waste handling, transportation, and disposal will intend to comply with all applicable regulations, including the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) Annex V requirements, and USEPA, USCG, BSEE, and BOEM regulations. These regulations include prohibitions and compliance requirements regarding the deliberate discharging of containers and other similar materials (i.e., trash and debris) into the marine environment as well as the protective measures to be implemented to prevent the accidental loss of solid material into the marine environment. For example, BSEE regulations 30 CFR § 250.300(a) and (b)(6) prohibit operators from deliberately discharging containers and other similar materials (i.e., trash and debris) into the marine environment, and 30 CFR § 250.300(c) requires durable identification markings on equipment, tools, containers (especially drums), and other material.

The USEPA and USCG regulations require operators to be proactive in avoiding accidental loss of solid materials by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Additionally, the debris awareness training, instruction, and placards required by the Protected Species Lease Stipulation should minimize the amount of debris that is accidentally lost overboard by offshore personnel (NMFS [2020a] Appendix B). In compliance with NTL BSEE-2015-G03, bp and its contractors intend to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of informational placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. Compliance with these requirements is expected to result in minimal and only accidental loss of solid waste. Consequently, there will be either no or negligible impacts from this factor.

A.8 Support Vessel and Helicopter Traffic

A.8.1 Physical Presence

IPFs associated with support vessel and helicopter traffic include their physical presence and operational sound. The existing shorebase facilities at Port Fourchon, Louisiana, will be used by bp for support vessel activities. Support helicopters are expected to be based at heliport facilities in Houma, Louisiana. No terminal expansion or construction is planned at either location.

NMFS (2020a) has found that support vessel traffic has the potential to disturb protected species (e.g., marine mammals, sea turtles, fishes) and creates a risk of vessel collisions. The probability of a vessel collision depends on the number, size, and speed of vessels as well as the distribution, abundance, and behavior of the species (Laist et al., 2001; Jensen and Silber, 2004; Hazel et al., 2007; Vanderlaan and Taggart, 2007; Conn and Silber, 2013; NMFS, 2020a). To reduce the potential for vessel collisions, BOEM 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 striking protected species and requires operators to report 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) replaces compliance with the NTL. In April 2021 (NMFS, 2021a), the 2020 NMFS Biological Opinion Appendix C Vessel Strike Avoidance and Dead/Injured Protected Species Reporting Protocols (NMFS, 2020a) was amended. The project will be supported by onshore crew boats and supply vessels making an estimated 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 five round trips per week between the project area and the heliport. The helicopter will be used to transport personnel and small supplies and will normally take the most direct route of travel between the shorebase and the project area when air traffic and weather conditions permit. Offshore support helicopters typically maintain a minimum altitude of 213 m (700 ft) while in transit offshore, 305 m (1,000 ft) over unpopulated areas or across coastlines, and 610 m (2,000 ft) over-populated areas and sensitive habitats such as wildlife refuges and park properties. Additional guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (NMFS, 2020a).

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 Green Canyon Block 743 during the proposed exploratory drilling project.

Vessel/Aircraft Type	Maximum Fuel Tank Storage Capacity	Estimated Trip Frequency or Duration
Helicopter	760 gal	5 flights per week
Work boat	5,000 bbl	2 trips per week

gal = gallons; bbl = barrel.

A.8.2 Operational Sound

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 sound, flow sound from water dragging along the hull, and bubbles breaking in the vessel's wake (Richardson et al., 1995). The intensity of sound from support vessels is roughly related to ship size, weight, and speed. Broadband source levels for smaller boats (a category that include supply and other service vessels) are in the range of 150 to 180 dB re 1 µPa m (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012).

Penetration of aircraft sound below the sea surface is greatest directly below the aircraft. Aircraft sound 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 for helicopters are generally below 500 Hz with source levels ranging from approximately 149 to 151 dB re 1 µPa m (for a Bell 212 helicopter) (Richardson et al., 1995). However, underwater sound levels received 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). The received level diminishes with increasing receiver depth when an aircraft is directly overhead, but may be stronger at mid-water than at shallow depths when an aircraft is not directly overhead (Richardson et al., 1995). Because of the relatively high expected airspeeds during transits and these physical variables, aircraft-related sound (including both airborne and underwater sound) is expected to be very brief in duration.

A.9 Accidents

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

- a small fuel spill, which is the most likely type of spill during OCS exploration activities; and
- a large oil spill, up to and including the WCD for this 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 from these accidents are analyzed in **Section C**.

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

Loss of Well Control. A loss of well control is the uncontrolled flow of a reservoir fluid that may result in the release of gas, condensate, oil, drilling fluids, sand, 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; 2017). Loss of well control may result in the release of drilling fluid and/or loss of 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; 2017). 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.9.1**). The potential for a loss of well control event will be minimized by adhering to the requirements of applicable regulations and NTL 2010-N10, which specifies additional safety measures for OCS activities.

Vessel Collisions. BSEE data show that there were 197 OCS-related collisions between 2007 and 2022 (BSEE, 2022). 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 during 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 (2017), vessel collisions occasionally occur during routine operations. Some of these collisions have caused spills of diesel fuel or chemicals. bp and its contractors intend to comply with all applicable USCG and BOEM safety requirements to minimize the potential for vessel collisions.

Dropped Objects. Objects dropped overboard from the drilling rig or support vessels 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, could result in a spill. Dropped objects could also result in seafloor disturbance and potential impacts to benthic communities. bp and its contractors intend to comply with all BOEM and BSEE safety requirements to minimize the potential for objects dropped overboard.

Chemical Spills. Chemicals are stored and used for pipeline hydrostatic testing, leak and pressure testing of subsea equipment and during drilling and in well completion operations. The relative quantities of their use is reflected in the largest volumes spilled (BOEM, 2017) with completion, workover, and treatment fluids comprising 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 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, 2017).

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

H_2S Release. GC 743 is classified as H_2S Absent. See DOCD Section 4 for general H_2S management information.

A.9.1 Small Fuel Spill

Spill Size. According to the analysis by BOEM (2017), the most likely type of small spill (<1,000 bbl) resulting from OCS activities is a failure related to the storage of oil or diesel fuel. Historically, most diesel spills have been ≤1 bbl, and this is predicted to be the most common spill volume in ongoing and future OCS activities in the Western and Central Gulf of Mexico Planning Areas (Anderson et al., 2012). As the spill volume increases, the incident rate declines dramatically (BOEM, 2017). 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 of the spill 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.

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 amounts of suspended solids (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico. Diesel fuel is readily and completely degraded by naturally occurring microbes (National Oceanic and Atmospheric Administration [NOAA], 2023c).

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, 2022). 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, 2022). 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 121 statute miles (195 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 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. A discussion of bp's response efforts if a spill were to occur during operational activities is provided in DOCD Appendix G.

Weathering. Following a diesel fuel spill, several physical, chemical, and biological processes, collectively called weathering, interact to change the physical and chemical properties of the diesel, and thereby influence its harmful effects on marine organisms and ecosystems. The most important weathering processes include spreading, evaporation, dissolution, dispersion into the water column, formation of water-in-oil emulsions, photochemical oxidation, microbial degradation, adsorption to suspended particulate matter, and stranding on shore or sedimentation to the seafloor (National Research Council, 2003a, International Tanker Owners Pollution Federation Limited, 2024).

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 Part 254.

A.9.2 Large Oil Spill (Worst Case Discharge)

Under this DOCD, bp proposes to drill one well in GC 743. 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. Day 1 WCD is estimated to be 28,847.8 barrels of oil per day (BOPD). The maximum duration of the blowout is estimated at 70 days. The rate profile associated with the well blowout over this 70-day scenario results in a potential worst case spill volume estimated at 1,565,000 million barrels.

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

bp is expected to comply with NTL 2010-N10 and the drilling safety regulations in 30 CFR Part 250, Subparts D and G, which specify additional safety measures for OCS activities.

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

The results for Launch Area 46 (where GC 743 is located) are presented in **Table 4**. The model predicts a <0.5% chance of contact with any shoreline within 10 days of a spill. Shoreline contact is predicted within 30 days for shorelines ranging from Matagorda County, Texas to Plaquemines Parish, Louisiana. The conditional probability of shoreline contact is low (1% to 3%) for all shorelines with predicted contact within 30 days.

Table 4. Conditional probabilities of a spill in Green Canyon Block 743 (GC 743) 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 GC 743 (represented by OSRA Launch Area 46) could contact shoreline segments (as referenced from Ji et al., 2004) within 3, 10, or 30 days.

Shoreline Segment	County or Parish and State	Conditional Probability of Contact [a] (%)		
		3 Days	10 Days	30 Days
C08	Matagorda County, Texas	--	--	1
C09	Brazoria County, Texas	--	--	1
C10	Galveston County, Texas	--	--	2
C12	Jefferson County, Texas	--	--	1
C13	Cameron Parish, Louisiana	--	--	3
C14	Vermilion Parish, Louisiana	--	--	1
C17	Terrebonne Parish, Louisiana	--	--	1
C18	Lafourche Parish, Louisiana	--	--	1
C20	Plaquemines Parish, Louisiana	--	--	3

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

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

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 deterministic 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. In the event of a diesel fuel spill, it is expected that weathering and evaporation will occur quickly. 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, nd).

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 (National Research Council, 2003a). Photo-oxidation attacks mainly the medium and high molecular weight PAHs in the oil on the water surface (Prince, 2014).

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 10 April 2023 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on 30 May 2023.

The bp 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 Part 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 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 Mexico. 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 Mexico, approximately 121 statute miles (195 km) from the nearest shoreline (Plaquemines Parish, Louisiana), 129 statute miles (208 km) from the onshore support base at Port Fourchon, Louisiana, and 166 statute miles (280 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed activities is approximately 2,081 m (6,828 ft) (**Figure 2**) (bp, 2023).

The seafloor in the vicinity of the proposed wellsite is relatively flat and smooth. The site clearance letter (bp, 2023) states there is a negligible potential for large-scale slope failures that could impact the area of proposed activities.

A detailed description of the regional affected environment, including meteorology, oceanography, geology, air and water quality, benthic communities, threatened and endangered species, biologically sensitive resources, archaeological resources, socioeconomic conditions, and other marine uses is provided in recent EISs (BOEM, 2012a; 2013; 2014a; 2015; 2016b; 2017, 2023a,b). These regional descriptions, applicable to GC 743, remain valid and are incorporated by reference. General background information is presented in the following sections, and brief descriptions of each potentially affected resource, including site-specific and new information if available, are presented in **Section C**.

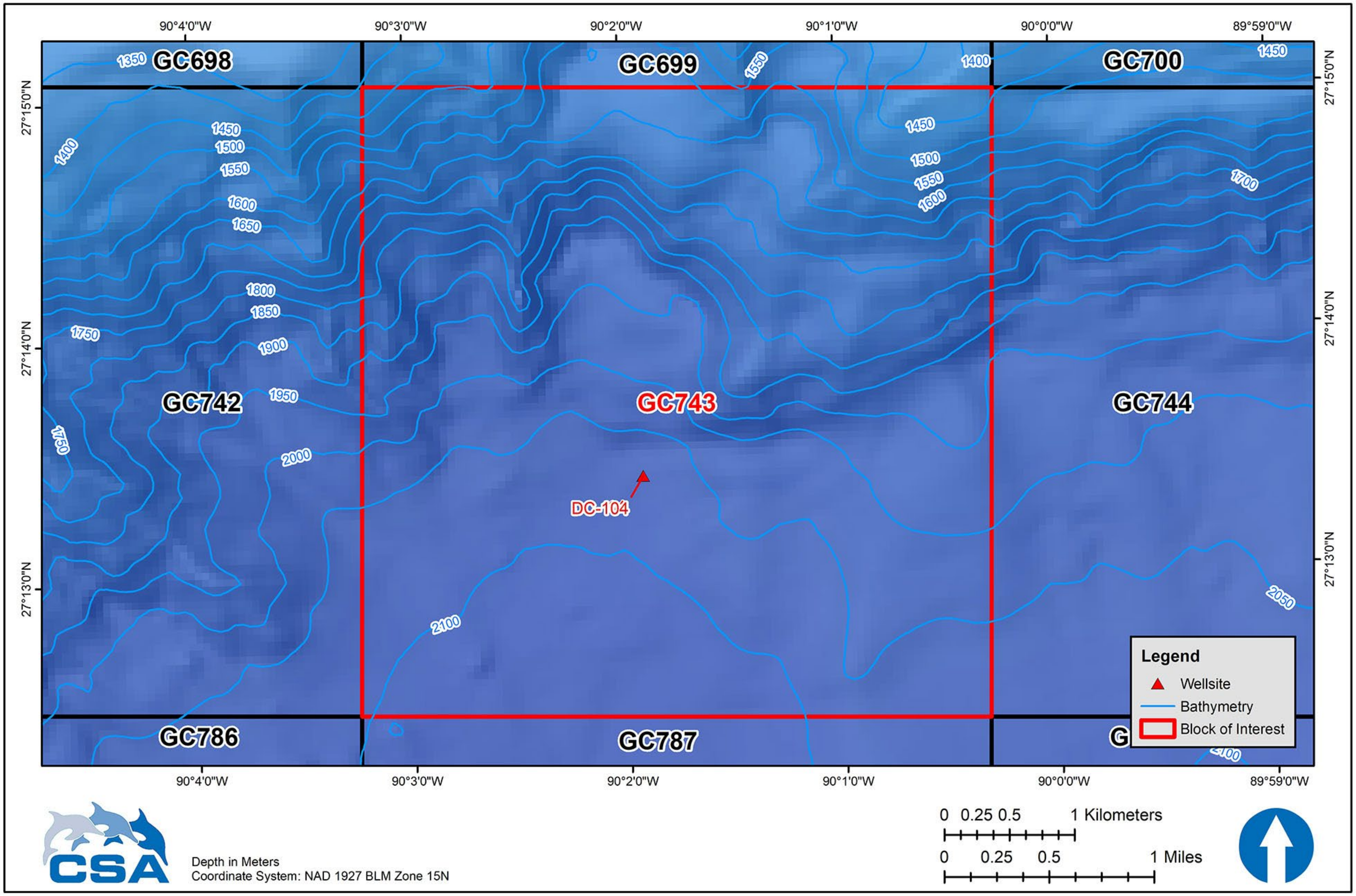

Figure 2. Bathymetric map of the project area showing the proposed wellsite surface hole location in Green Canyon Block 743.

C. Impact Analysis

This section analyzes the potential direct and indirect impacts of routine activities and accidents. Impacts have been analyzed extensively in lease sale EISs for the Central and Western Gulf of Mexico Planning Areas (BOEM, 2013; 2014a; 2015; 2016a,b; 2017, 2023b) and this information in these documents is incorporated by reference. This section is organized by the environmental resources identified in **Table 2** and addresses each IPF potentially affecting the resource.

C.1 Physical/Chemical Environment

C.1.1 Air Quality

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

In general, ambient air quality of coastal counties along the Gulf of Mexico is relatively good (BOEM, 2012a). As of February 2024, Mississippi, Alabama, and Florida Panhandle coastal counties, in proximity to the project area, are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2024). St. Bernard Parish in Louisiana is a nonattainment area for sulfur dioxide based on the 2010 standard. One coastal metropolitan area in Texas (Houston-Galveston-Brazoria) is a nonattainment area for 8-hour ozone (2015 Standard).

Winds in the region are driven by the anticyclonic (clockwise) atmospheric circulation around the Bermuda High, a semi-permanent, subtropical area of high pressure in the North Atlantic Ocean off the East Coast of North America that migrates east and west with varying central pressure (BOEM, 2017). The Gulf of Mexico is located to the southwest of this circulation center, resulting in a prevailing southeasterly to southerly flow, which is conducive to transporting emissions toward shore. However, circulation is also affected by tropical cyclones (hurricanes) during summer and fall and by extratropical cyclones (cold fronts) during winter.

As noted earlier, based on calculations made pursuant to applicable regulations and guidance in NTL BOEM-2020-G01, emissions from drilling activities are not expected to be significant. Therefore, the only potential effects to air quality would be from air pollutant emissions associated with routine operations and accidental spills (a small fuel spill or a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Air Pollutant Emissions

Air pollutant emissions are the only routine IPF likely to affect air quality. Offshore air pollutant emissions will result primarily from the drilling and installation operations and service vessels. These emissions occur mainly from combustion or burning of diesel and Jet-A aircraft fuel. The combustion of fuels occurs primarily in generators, pumps, or motors and from lighter fuel motors. Primary air pollutants typically associated with OCS activities are suspended PM, SOx, NOx, VOCs, CO, NH_3, and Pb. As noted by BOEM (2017), 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. However, support vessel and helicopter traffic entering or departing coastal facilities will release air pollutants in these areas during the project period. The incremental contribution to cumulative impacts from activities described in bp's DOCD is minimal and is not expected to cause or contribute to a violation of NAAQS.

Greenhouse gas emissions may contribute to climate change, with important effects on temperature, rainfall, frequency of severe weather, ocean acidification, and sea level rise (Intergovernmental Panel on Climate Change, 2014). Greenhouse gas emissions from this proposed project represent a negligible contribution to the total greenhouse gas emissions from reasonably foreseeable activities in the Gulf of Mexico and are not expected to significantly alter or exceed any of the climate change impacts evaluated in the Programmatic EIS (BOEM, 2023a). Carbon dioxide (CO_2) and methane (CH_4) emissions from the project would constitute a small incremental contribution to greenhouse gas emissions from all OCS activities. According to Programmatic and OCS lease sale EISs (BOEM, 2016a; 2017), estimated CO_2 emissions from OCS oil and gas sources are 0.4% of the U.S. total. Because of the distance from shore, routine operations in the project area are not expected to have any impact on air quality conditions along the coast, including nonattainment areas.

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

The Breton Wilderness Area, which is part of the Breton National Wildlife Refuge (NWR), is designated under the Clean Air Act as a Prevention of Significant Deterioration (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. The project area is approximately 174 statute miles (280 km) from the Breton Wilderness Area. bp and its contractors intend to comply with all BOEM requirements regarding air emissions.

There are three Class I air quality areas on the west coast of Florida: St. Marks National Wildlife Refuge in Wakulla County, Chassahowitzka National Wildlife Refuge in Hernando County, and Everglades National Park in Monroe, Miami-Dade, and Collier counties. The project area is approximately 384 statute miles (618 km) from the closest Florida Class I air quality area (St. Marks National Wildlife Refuge Class I Air Quality Area). bp expects to comply with emissions requirements as directed by BOEM.

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; 2017, 2023a,b). The probability of a small spill would be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential impacts. DOCD Appendix G includes a detailed discussion of the spill response measures that would be employed.

The EIA small spill scenario is proposed to occur in offshore waters at or near the drilling rig. 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, 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.

Because of the offshore location of the proposed small fuel spill, coastal air quality would not be affected because the spill would be expected to be degraded by weathering processes and dissipate prior to making landfall or reaching coastal waters (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; 2017). A large oil spill could potentially affect air quality by introducing VOCs into the atmosphere through evaporation. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill 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, including the USEPA.

Because of the project area's location (121 statute miles [195 km]) from the nearest shoreline, most air quality impacts would occur in offshore waters with minimal chance to affect onshore air quality. However, depending on the spill trajectory and the effectiveness of spill response measures, coastal air quality could be affected if oil on the sea surface approaches or contacts the coast.

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 Mexico are relatively similar with respect to patterns of water column temperature, salinity, and oxygen (BOEM, 2017). Kennicutt (2000) noted that the deepwater region has little evidence of contaminants in the dissolved or particulate phases of the water column. Within the northern Gulf of Mexico, there are localized areas (termed natural seeps) that release oil, gas, and brines from sub-surface deposits into near surface sediments and up through the water column. No natural seeps were noted within 610 m (2,000 ft) of the proposed wellsite (bp, 2023).

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

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

Water-based drilling muds and cuttings will be released at the seafloor during the initial well intervals before the marine riser, which allows returns to the surface, is set. Excess cement slurry also will be released at the seafloor during casing installation for the riserless portion of the drilling operations. The seafloor discharges of WBM and associated drill cuttings will result in seafloor disturbances that will produce locally turbid conditions in the water column near the seafloor. The turbidity plume will be carried away from the well by near-bottom currents and, based on current speed(s), may be detectable within tens to hundreds of meters of the wellbore. As suspended WBM and resuspended sediments settle to the seafloor, the water clarity will return to background conditions within minutes to a few hours after drilling of these well intervals ceases (Neff, 1987). Discharges of WBM and cuttings are likely to have little or no impact on water quality due to the low toxicity and rapid dispersion of these discharges (National Research Council, 1983; Neff, 1987; Hinwood et al., 1994).

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

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

Other discharges in accordance with the NPDES permit, such as desalination unit brine; BOP water-based 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 offshore 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.

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; 2017, 2023a,b). The small spill scenario in the EIA is proposed to occur in offshore waters at or near the drilling rig and/or installation vessels. 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 weight of diesel fuel (i.e., ultra-low-sulfur marine diesel fuel) constituents is light to intermediate and can be readily degraded by physiochemical weathering processes (e.g., evaporation, dissolution, dispersion, and photochemical oxidation) and biological processes (microbial degradation). Diesel fuel 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 fuel 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 fuel 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, 2023c). It is possible for the diesel fuel 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 levels of suspended solids (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico.

Some vessels may contain Heavy Fuel Oil (i.e., No. 6 Fuel Oil, Bunker C) that may sink or be suspended in the water column. This fuel can stick to surfaces and does not readily disperse or breakdown from weathering. However, encounters with these vessels are considered rare and not further discussed.

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 spill 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 fuel are readily and completely degraded by naturally occurring microbes (NOAA, nd; 2017a). Given the open ocean location of the project area, the extent and duration of water quality impacts from a small spill would not be significant.

Impacts of a Large Oil Spill

Potential impacts of a large oil spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a; 2015; 2016b; 2017, 2023a,b). Most of the spilled oil would be expected to form a slick at the surface, although information from the *Deepwater Horizon* incident indicates that submerged oil droplets can be produced when subsea dispersants are applied at the wellhead (Camilli et al., 2010; Hazen et al., 2010; NOAA, 2011a,b,c). Dispersants would be applied only after approval from the Federal On-Scene Coordinator with collaboration from the USEPA and Regional Response Team Region 6.

The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of released hydrocarbons. 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, 2020).

Hazen et al. (2010) studied the impacts and fate of oil released 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). Additional studies investigated the effects of deepwater dissolved hydrocarbon gases (e.g., methane, propane, and ethane) and the microbial response to a deepwater oil spill suggest dissolved hydrocarbon gases may promote rapid hydrocarbon respiration 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 121 statute miles (195 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 from Matagorda County, Texas to Plaquemines Parish, Louisiana could be affected within 30 days of a spill (1% to 3% conditional probability within 30 days).

C.2 Seafloor Habitats and Biota

The water depth at the location of the proposed activities is approximately 2,081 m (6,828 ft). According to BOEM (2016a), existing information for the deepwater Gulf of Mexico indicates that the seafloor is composed primarily of soft sediments; exposed hard substrate habitats and associated biological communities are rare. The shallow hazards assessment did not note the presence of seepage locations within 610 m (2,000 ft) of the proposed activities (bp, 2023) and noted a negligible potential for the presence of hard bottom communities. 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; Spies et al., 2016) can be used to describe typical baseline benthic communities in the area. **Table 5** summarizes data collected at two stations in water depths similar to those in the proposed project area.

Table 5. Baseline benthic community data from stations near the project area in similar depths sampled during the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Adapted from: Wei, 2006; Rowe and Kennicutt, 2009).

Station	Water Depth (m)	Abundance		
		Meiofauna (>63 µm; individuals m^{-2})	Macroinfauna (>300 mm; individuals m^{-2})	Megafauna (>1 cm; individuals ha^{-1})
C4	1,463	273,585	3,045	743
GKF	2,465	84,348	737	--

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

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 84,000 to 274,000 individuals m^{-2} (**Table 5**) (Rowe and Kennicutt, 2009). Nematodes, nauplii, and harpacticoid copepods were the three dominant meiofaunal groups, accounting for about 90% of total abundance.

The benthic macroinfauna is characterized by small mean individual sizes and low densities, both of which reflect the meager primary production in surface waters of the Gulf of Mexico continental slope (Wei, 2006). Densities decrease exponentially with water depth. Based on the Wei (2006) equation, the macroinfauna density in the project area in GC 743 is expected to be approximately 1,455 individuals m^{-2}.

Polychaetes are typically the most abundant macroinfaunal group on the northern Gulf of Mexico continental slope, followed by amphipods, tanaids, bivalves, and isopods. Carvalho et al. (2013) found polychaete abundance to be higher in the central region of the northern Gulf of Mexico when compared to the eastern and western regions. Wei (2006) recognized four depth-dependent faunal zones (1 through 4), two of which are divided horizontally. The project area is in Zone 3E. This is a broad zone that encompasses the west flank of the lower Mississippi Fan, the lower Mississippi Canyon, the lower DeSoto Canyon, the lower West Florida Terrace, the deep Mississippi Fan, and the base of the Sigsbee Escarpment. The most abundant species in this zone were the polychaetes *Paraonella monilaris* and *Tharyx marioni*; the bivalves *Heterodonta* spp.; and the isopod *Macrostylis* sp.

The megafaunal density at a station in the vicinity of the project area was 743 individuals ha^{-1}. Common megafauna included motile taxa such as echinoderms, cnidarians (sessile sea anemones, pens and whips), decapod crustaceans, and demersal fish (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).

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

Impacts of Physical Disturbance to the Seafloor

In water depths such as those in the project area, DP drilling rigs disturb the seafloor only around the wellbore (surface hole location) where the bottom template and BOP are located. Depending upon the specific well configuration, this area of disturbance is generally about 0.25 ha (0.62 ac) per well (BOEM, 2012a). Additional areas of seafloor disturbance will occur where the jumper, steel tube flying lead, and electrical flying leads are placed on the seafloor. It is expected these areas of disturbance will be limited to the immediate vicinity of the installed equipment.

The areal extent of these impacts from the proposed project 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 Mexico continental slope (Gallaway, 1988; Gallaway et al., 2003; Rowe and Kennicutt, 2009). Impacts from the physical disturbance of the seafloor during this project are expected to be spatially localized and temporally short term. Therefore, these disturbances will not likely have a significant impact on soft bottom benthic communities in the region.

Impacts of Effluent Discharges

Drilling muds and cuttings are the only effluents that could be present in vicinity of the wellsite that are likely to affect local soft bottom benthic communities. During initial well drilling interval(s) before the marine riser is set, cuttings and water-based mud will be released at the seafloor. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Cement slurry components typically include cement mix and some of the same chemicals used in water-based drilling muds (Boehm et al., 2001; Fink, 2016). The main impacts will be burial and smothering of benthic organisms within several meters to tens of meters around the wellbore where cuttings and water-based muds physically contact the seafloor. Soft bottom sediments disturbed by cuttings, drilling muds, and cement slurry will eventually be recolonized through larval settlement and migration from adjacent areas. Because some deep-sea biota grow and reproduce slowly, recovery may require several years for the affected area within meters to tens of meters of the wellbore.

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

The areal extent of impacts from drilling discharges will be small. Assuming a typical effect radius of 500 m (1,640 ft), the affected area around the wellsite would represent about 3% of the seafloor within a lease block. Impacts from drilling discharges are expected to have no significant impact on these ubiquitous soft bottom benthic communities in the region. It is expected that the rig will move to safe zones for short periods of time to perform maintenance on critical equipment. All discharges during these times are expected to meet NPDES permit requirements.

Impacts of a Large Oil Spill

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

While impacts from a large oil spill are anticipated to be confined to the immediate vicinity of the wellhead, depending on the specific circumstances of the incident, additional benthic community impacts could extend beyond the immediate vicinity of the wellhead (BOEM, 2017). 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 features or areas that could support high-density chemosynthetic communities or high-density hard bottom communities, including deepwater coral-dominated communities. Chemosynthetic communities were discovered in the central Gulf of Mexico in 1984 and have been studied extensively (MacDonald, 2002). Deepwater coral communities are also known from numerous locations in the Gulf of Mexico (Brooke and Schroeder, 2007; CSA International, 2007; Brooks et al., 2012). In the Gulf of Mexico, deepwater coral communities occur almost exclusively on exposed authigenic carbonate rock created by a biogeochemical (microbial) process.

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

The wellsite clearance report stated a negligible chance of high-density deepwater benthic community presence within 610 m (2,000 ft) of the proposed wellsite (bp, 2023).

The only IPF identified for this project that could affect high-density deepwater benthic communities is a large oil spill from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel would float and dissipate on the sea surface. Physical disturbance and effluent discharge are not considered IPFs for deepwater benthic communities because these communities are not expected to be present down current of the proposed wellsite.

Impacts of a Large Oil Spill

A large oil spill caused by a seafloor blowout could cause direct impacts (i.e., caused by the physical impacts of a blowout) on benthic communities within approximately 300 m (984 ft) of the wellhead (BOEM, 2012a; 2013). However, based on the wellsite clearance report for the proposed activities (bp, 2023), there is a negligible chance of the presence of high-density deepwater benthic communities within 610 m (2,000 ft). Therefore, this type of impact is not expected.

Additional benthic community impacts could extend beyond the immediate vicinity of the wellhead, depending on the specific circumstances (BOEM, 2017). 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, 2017). 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 Federal On-Scene Coordinator upon consultation with the regional response team, including USEPA, prior to the use of dispersants.

The biological effects and fate of the oil remaining in the Gulf of Mexico 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, 2011; Reddy et al., 2012; Valentine et al., 2014). Hazen et al. (2010) reported changes in plume hydrocarbon composition with distance from the source. Incubation experiments with environmental isolates demonstrated faster than expected hydrocarbon biodegradation rates at 5°C (41°F). Based on these results, Hazen et al. (2010) suggested the potential exists for intrinsic bioremediation of the oil plume in the deepwater column without substantial oxygen drawdown.

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

C.2.3 Designated Topographic Features

GC 743 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 67 statute miles (108 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 from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward 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 165 statute miles (266 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 from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward 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 Mexico Planning Area leases in water depths of 100 m (328 ft) or less and portions of Pensacola and Destin Dome Area blocks in the Central Gulf of Mexico Planning Area. The nearest block covered by the Live Bottom Stipulation, as defined by NTL 2009-G39, is located approximately 200 statute miles (322 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 from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward 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, all of 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 6**. The table also indicates the location of critical habitat (if designated in the Gulf of Mexico). Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. NMFS has jurisdiction for ESA-listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of Mexico. The USFWS has jurisdiction for ESA-listed birds, the West Indian manatee (*Trichechus manatus*), and sea turtles while on their nesting beaches.

Table 6. Federally listed Endangered and Threatened species potentially occurring in the project area and along the northern Gulf Coast. Adapted from: U.S. Fish and Wildlife Service (2020) and National and Oceanic Atmospheric Administration Fisheries (2020).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Rice's whale[1]	*Balaenoptera ricei*	E	X	--	None
Sperm whale	*Physeter macrocephalus*	E	X	--	None
West Indian manatee	*Trichechus manatus*[2]	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T,E[3]	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); *Sargassum* habitat including most of the central & western Gulf of Mexico.
Green turtle	*Chelonia mydas*	T	X	X	None
Leatherback turtle	*Dermochelys coriacea*	E	X	X	None
Hawksbill turtle	*Eretmochelys imbricata*	E	X	X	None
Kemp's ridley turtle	*Lepidochelys kempii*	E	X	X	None
Birds					
Piping Plover	*Charadrius melodus*	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	*Grus americana*	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Rufa Red Knot	*Calidris canutus rufa*	T	--	X	None
Black-capped Petrel	*Pterodroma hesitata*	E	X	--	None
Fishes					
Oceanic whitetip shark	*Carcharhinus longimanus*	T	X	--	None
Giant manta ray	*Mobula birostris*	T	X	X	None
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	*Epinephelus striatus*	T	--	X	Florida Keys and the Dry Tortugas
Smalltooth sawfish	*Pristis pectinata*	E	--	X	Southwest Florida
Invertebrates					
Elkhorn coral	*Acropora palmata*	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	*Acropora cervicornis*	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	*Dendrogyra cylindrus*	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Rough cactus coral	*Mycetophyllia ferox*	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island

Table 6. (Continued).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Lobed star coral	*Orbicella annularis*	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	*Orbicella faveolata*	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	*Orbicella franksi*	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	*Procambarus econfinae*	T	--	X	South-central Bay County, Florida
Queen conch	*Aliger gigas*	T	--	X	None
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus subsp. Ammobates, allophrys, trissyllepsis, and peninsularis, respectively*	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	*Microtus pennsylvanicus dukecampbelli*	E	--	X	None

E = Endangered; T = Threatened; X = potentially present; -- = not present.

1 In 2021, the National Marine Fisheries Service recognized that what had previously been accepted as a subspecies of the Bryde's whale is actually a separate species. The reclassification is formerly recognized under 86 *Federal Register* (FR) 47022 effective date 22 October 2021 as the Rice's whale (*Balaenoptera ricei*).

2 There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (T. m. manatus), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico.

3 The Northwest Atlantic Ocean Distinct Population Segment (DPS) of loggerhead turtles is designated as Threatened (76 FR 58868). The National Marine Fisheries Service and the U.S. Fish and Wildlife Service designated critical habitat for this DPS, including beaches and nearshore reproductive habitat in Mississippi, Alabama, and the Florida Panhandle as well as *Sargassum* spp. Habitat throughout most of the central and western Gulf of Mexico (79 FR 39756 and 79 FR 39856).

Coastal Endangered or Threatened species that may occur along the U.S. 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 and Queen conch) as indicated in **Table 6** and discussed in individual sections. Two other coastal bird species (Bald Eagle [*Haliaeetus leucocephalus*] and Brown

Pelican [*Pelecanus occidentalis*]) are no longer federally listed as Endangered or Threatened; these are discussed in **Section C.4.2**.

Five sea turtle species, the Rice's whale (*Balaenoptera ricei*), sperm whale (*Physeter macrocephalus*), oceanic whitetip shark (*Carcharhinus longimanus*), giant manta ray (*Mobula birostris*), and Black-capped petrel (*Pterodroma hasitata*) are the only Endangered or Threatened species that could potentially occur within 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 Mexico for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, sperm whale, or Black-capped Petrel.

Four Endangered mysticetes (blue whale [*Balaenoptera musculus*], fin whale [*Balaenoptera physalus*], North Atlantic right whale [*Eubalaena glacialis*], and sei whale [*Balaenoptera borealis*]) have been reported in the Gulf of Mexico, and are considered rare or extralimital (Würsig et al., 2017). These species are not included in the most recent NMFS stock assessment report (Hayes et al., 2022) nor in the most recent BOEM multisale EIS (BOEM, 2017); therefore, they are not considered further in the EIA.

The Rice's whale exists in the Gulf of Mexico as a small, resident population. This species was formally known as a subspecies to the Bryde's whale (*Balaenoptera edeni brydei*) until a DNA study identified it as a separate species (Rosel et al., 2021). It is the only baleen whale known to be resident to the Gulf of Mexico. 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. (2022a) suggests the range may be broader than previously thought (see **Section C.3.2**).

In several recent acoustic studies in the Gulf of Mexico (Soldevilla et al., 2022a,b; 2024), all Bryde's whale complex individuals are assumed to be Rice's whales. However, Bryde's whales have a global tropical and sub-tropical range that can include the Gulf of Mexico. Moreover, in the latest NMFS Rice's whale Marine Mammal Stock Assessment Report (Hayes et al., 2023), all previous data of Gulf of Mexico Bryde's whales from studies that pre-dated the Rosel et al. (2021) study that determined that Rice's whales are a distinct species were now assumed to all be Rice's whales. However, it is unclear on what percentage of Bryde's whale complex individuals that live or previously lived in Gulf of Mexico are Rice's whales vs Bryde's whales due to having no DNA studies that analyzed a representative population of Gulf of Mexico Bryde's whale complex individuals.

The giant manta ray could occur in the project area but is most commonly observed in the Gulf of Mexico at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of Mexico 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. Nassau grouper critical habitat was designated in January 2024 and includes areas in the southeast Gulf of Mexico near the Dry Tortugas and Florida Keys. 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. The Panama City crayfish (*Procambarus econfinae*) is a coastal species in south-central Bay County, Florida and is not expected to occur in the project area.

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicronis*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), pillar coral (*Dendrogyra cylindrus*), and rough cactus coral (*Mycetophyllia ferox*). These seven species all have designated critical habitat in the Florida Keys; staghorn coral and elkhorn coral also have designated critical habitat near the Dry Tortugas. These corals are shallow water, zooxanthellate species (containing symbiotic photosynthetic zooxanthellae which contribute to their nutritional needs) and so are not present in the deepwater project area (see **Section C.3.17**).

There are no other Threatened or Endangered species in the Gulf of Mexico that are 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)

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

- The level of direct human-caused mortality exceeds the potential biological removal level;
- Based on the best available scientific information, is in decline and is likely to be listed as a Threatened species under the ESA within the foreseeable future; or
- 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 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 Mexico, the impacts from many of these threats are identified as either low or unknown (BOEM, 2012a).

The distribution of sperm whales in the Gulf of Mexico is correlated with mesoscale physical features such as eddies associated with the Loop Current (Jochens et al., 2008). Sperm whale populations in the north-central Gulf of Mexico are present throughout the year (Davis et al., 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-meter (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 observed in the Gulf of Mexico during the MMS-funded Sperm Whale Seismic Study (SWSS) consisted 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 PSO sighting reports from seismic mitigation surveys in the Gulf of Mexico conducted over a 6-year period found a mean group size for sperm whales of 2.5 individuals (Barkaszi et al., 2012). In these mitigation surveys, sperm whales were the most common large cetacean encountered. Tagging and observation data from the SWSS also showed that sperm whales' transit through the vicinity of the project area. Movements of satellite-tracked individuals suggest that this area of the continental slope is within the home range of the Gulf of Mexico population (within the 95% utilization distribution) (Jochens et al., 2008).

IPFs that may potentially affect sperm whales include drilling rig and 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.

Although NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on sperm whales. NMFS (2020a) estimates that no more than three sperm whales will be non-lethally taken, with one sperm whale lethally taken through the ingestion of marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on sperm whales and is not discussed further (See **Table 2**).

Impacts of Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

Sound from routine drilling and 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 sound 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 sound was found to result in a reduced number of whale calls in the Gulf of Mexico (Azzara et al., 2013).

NMFS (2018a) lists sperm whales in the same functional hearing group (i.e., mid frequency cetaceans) as most dolphins and other toothed whales (i.e., odontocetes), with an estimated hearing sensitivity from 150 Hz to 160 kHz. Therefore, DP vessel-related sound is likely to be audible to sperm whales. Frequencies <150 Hz produced by the drilling operations may be audible but are not likely to be perceived with any significance by mid-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 whose vocalizations between 12 Hz and 28 kHz (Wartzok and Ketten, 1999). Generally, most of the vocalizations produced by sperm whales occur at frequencies below 10 kHz, although diffuse energy up to and past 20 kHz is common, with source levels up to 236 dB re1 µPa m (Møhl et al., 2003).

It is expected that, due to the relatively stationary nature of the proposed drilling and installation operations, sperm whales would move away from the proposed operations area, and sound levels that could cause auditory injury would be avoided. Sound associated with proposed vessel operations may cause behavioral disturbances to sperm whales. Observations of behavioral responses of marine mammals to anthropogenic sound, in general, have been limited to short term behavioral responses, which included the temporary cessation of feeding, resting, or social interactions (NMFS, 2009a). Animals can determine the direction from which a sound arrives based on cues, such as differences in arrival times, sound levels, and phases at the two ears. Thus, an animal's directional hearing capabilities have a bearing on its ability to avoid sound sources.

NMFS (2018a) presents criteria that are used to determine physiological (i.e., injury) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2018a) and therefore, revert to thresholds established and published by NMFS in FR 70(7): 1871-1875 (NMFS and NOAA, 2005). Behavioral disturbance thresholds for marine mammals are applied equally across all functional hearing groups. Received SPL of 120 dB re 1 µPa from a non-impulsive source is considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, in the case of behavioral responses, exposure to above-threshold sound 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).

For mid-frequency cetaceans exposed to non-impulsive sources, acoustic injury such as permanent threshold shifts are estimated to occur when the mammal has received a sound exposure level over 24 hours (SEL_{24h}) of 198 dB re 1 μPa^2 s. Similarly, temporary threshold shifts are estimated to occur when the mammal has received an SEL_{24h} of 178 dB re 1 μPa^2 s. Due to transient nature of sperm whales and the stationary nature of drilling 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.

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar marine sound sources. Drilling and installation-related marine sound associated with this project may contribute to increases in the marine sound environment within the region, but it is not expected to be at amplitudes sufficient to result in auditory injuries to sperm whales. The proposed activities may cause behavioral effects, primarily avoidance or temporary displacement from the project area, but are not expected to be biologically significant for the population. Drilling rig and installation vessel lighting and presence are not expected to impact sperm whales (NMFS, 2007; BOEM, 2016a; 2017) and therefore, are not identified as IPFs.

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 collisions, which are identified as a threat in the recovery plan for this species (NMFS, 2010b). To reduce the potential for vessel collisions, BOEM issued BOEM-2016-G01. This NTL recommends that vessel operators and crews receive protected species identification training. 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 as well as the amendment in April 2021 (NMFS, 2021a). Vessel operators are required to maintain a vigilant watch for and report sightings of any injured or dead protected species. In addition, when sperm whales are sighted, vessel operators and crews are required to maintain a distance of 100 m (328 ft) or greater whenever possible (NTL BOEM 2016-G01 and NMFS, 2020a, 2021a).

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 sperm whales are 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 sperm 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 [2020a] Appendix C). Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing sperm whales. However, this mitigation is effective only during daylight hours and during periods of adequate visibility.

NMFS (2020a) 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 Mexico. 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 Appendix C of NMFS (2021a) in addition to the NTL BOEM-2016-G01, NMFS 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 Mexico stock of sperm whales is 2.0 (Hayes et al., 2022). 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. Mortality of a single sperm whale would constitute a significant impact to the local (Gulf of Mexico) 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 responses 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 Mexico, support helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animals. Although whales may respond to helicopters (Smultea et al., 2008), NMFS (2020a) 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 (2020a) and BOEM (2017). 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 Mexico populations concerning composition and fate of petroleum and spill-treating agents in the marine environment, aspects of cetacean ecology, and physiological and toxic effects of oil on cetaceans. For this 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 of the spill 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 is expected to be brief and therefore potential for impacts to be minimal.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2020a) and BOEM (2017, 2023a,b). 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, and dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey; and stress from the activities and marine sound of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Hayes et al., 2020). 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 collisions, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for colliding with or disturbing these animals. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) and the amendment in April 2021 (NMFS, 2021) replaces compliance with the NTL. Based on the current PBR level for the Gulf of Mexico stock of sperm whales (2.0), mortality of a single sperm whale would constitute a significant impact to the local (Gulf of Mexico) stock of sperm whales but would not likely be significant at the species level.

C.3.2 Rice's Whale (Endangered)

A study by Rosel et al. (2021), identified the genetically distinct northern Gulf of Mexico 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. The Rice's whale is the only year-round resident baleen whale in the northern Gulf of Mexico. The Rice's whale is sighted most frequently in the waters over DeSoto Canyon between the 100 m (328 ft) and 1,000 m (3,280 ft) isobaths (**Figure 3**; Rosel et al., 2016; Hayes et al., 2021). **Figure 3** shows the Rice's whale Biologically Important Area defined in 2015 after ESA Section 7 consultations between NMFS and other agencies, as well as the Rice's Whale Core Distribution Area defined in 2019 by NMFS.

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 Mexico. Soldevilla et al. (2022a) identified new variants of long-moan calls along the northwestern Gulf of Mexico shelf break that were determined to share distinctive features with typical eastern Gulf of Mexico long-moan calls. A genetically confirmed sighting of a Rice's whale individual offshore Corpus Christi, Texas in 2017, along with the newly identified long-moan calls in the northwestern Gulf of Mexico indicate that Rice's whales may occur in a broader range in the Gulf of Mexico than previously known and this broader range should be considered when designating critical habitat. The sighting of this individual in 2017 partially resulted in the issuance of BOEM NTL-2023-G01, which established an Expanded Rice's Whale Area that encompasses all areas in the northern Gulf of Mexico between the 100 and 400 m isobaths (**Figure 3**).

Kiska 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 (e.g., 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 although juveniles can be within the surficial waters (Smithsonian Tropical Research Institute, 2023). 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 it is expected to be unlikely given the rate of sightings of the whales.

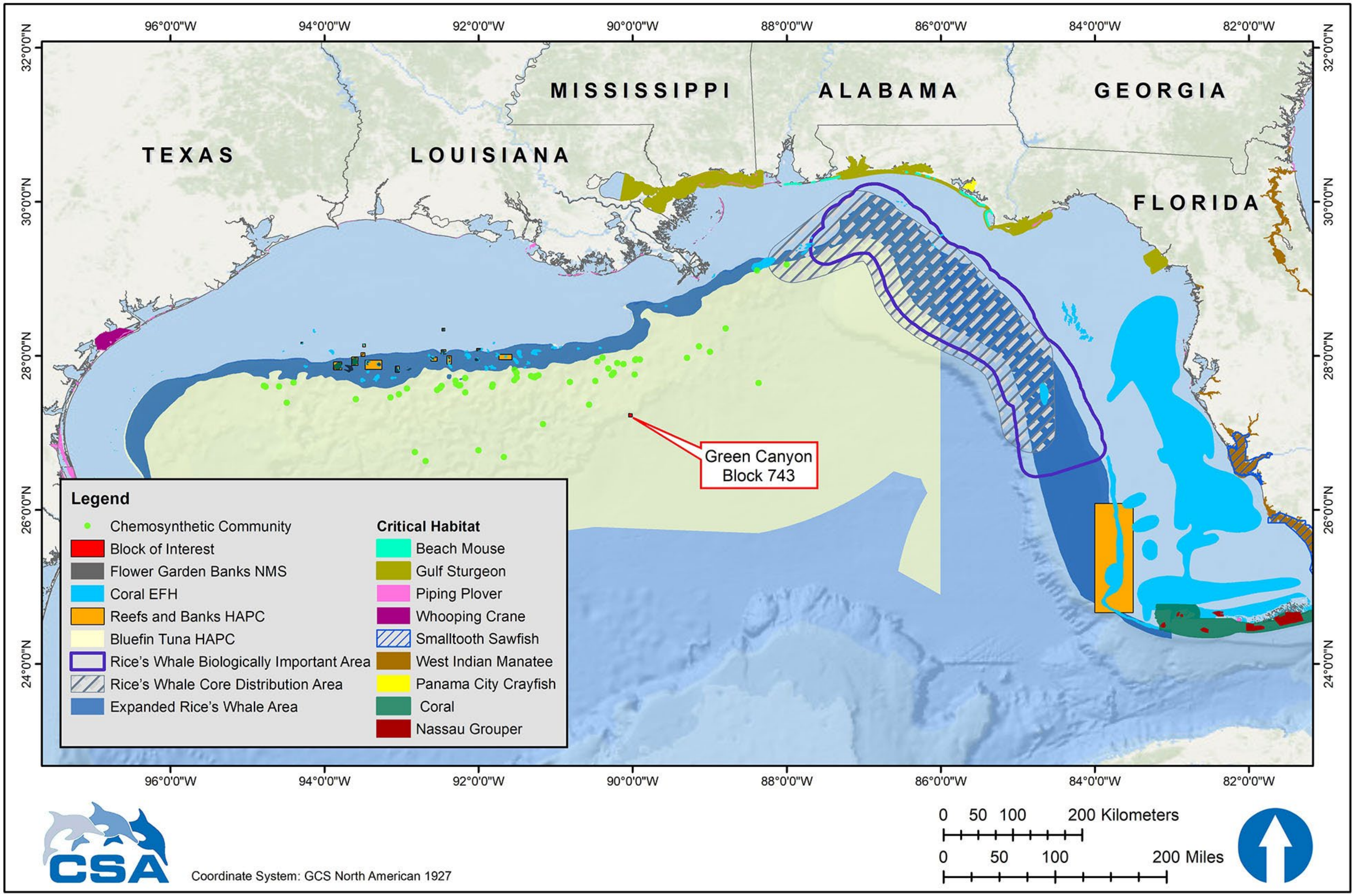

Figure 3. Location of selected environmental features in relation to the project area. EFH = Essential Fish Habitat; HAPC = Habitat Area of Particular Concern; NMS = National Marine Sanctuary.

In 2014, a petition was submitted to designate the northern Gulf of Mexico population as a DPS and list it as Endangered under the ESA (Natural Resources Defense Council, 2014). This petition received a 90-day positive finding by NMFS in 2015 and a proposed rule to list was published in 2016 (Hayes et al., 2019). On 15 April 2019, NMFS issued a final rule to list the Gulf of Mexico DPS of Bryde's whale as Endangered under the ESA. NMFS final rule on the reclassification (86 FR 47022) does not affect the ESA standing; thus, the Rice's whale is listed as an Endangered species.

Although it is unlikely that the Rice's whales would occur in the project area, IPFs that could affect the Rice's whales, if present, include drilling rig and installation vessel 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 Mexico.

Although NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on Rice's whales. NMFS (2020a) estimated one sublethal take and no lethal takes of Rice's whale (Bryde's whales at the time of publication) from marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on Rice's whales and is not further discussed (See **Table 2**).

NTL BOEM 2023-G01 provides recommendations and guidance for operators regarding suggested measures to expand protections for the Rice's whale while BOEM and BSEE are involved in consultation with NMFS on the amended 2020 Biological Opinion. The NTL guidance applies to the Expanded Rice's Whale Area (**Figure 3**), comprising the entire northern Gulf of Mexico between the 100 and 400 m isobaths.

Impacts of Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

NMFS (2018a) lists Rice's whales in the functional hearing group of low frequency cetaceans (baleen whales), with an estimated hearing sensitivity from 7 Hz to 35 kHz. Sound produced by the drilling rig and installation-associated vessels may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. Sound associated with drilling activities is relatively low in intensity relative to impulsive sources such as airgun sound, and an individual animal's sound exposure would be transient. As discussed in **Section A.1**, an actively drilling rig may produce broadband (10 Hz to 10 kHz) source levels ranging from approximately 180 to 190 dB re 1 μPa m (Hildebrand, 2005). Frequencies <1,000 Hz produced by the drilling operations are more likely to be perceived by low-frequency cetaceans, such as the Rice's whale.

It is expected that, due to the relatively stationary nature of the drilling and installation operations, Rice's whales would move away from the proposed operations area, and sound levels that could cause auditory injury would be avoided. Sound associated with proposed vessel operations may cause behavioral disturbance effects to individual Rice's whales. NMFS (2018a) presents criteria that are used to determine physiological (i.e., acoustic injury) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2018a) and therefore, revert to thresholds established and published by NMFS in 70 FR 1871. Received SPL of 120 dB re 1 μPa from non-impulsive sources are considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. 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).

For low-frequency cetaceans, specifically the Rice's whale, permanent and temporary threshold shift onset is estimated to occur at SEL_{24h} of 199 dB re 1 μPa^2 s and 179 re 1 μPa^2 s, respectively. Sounds generated by drilling operations, located within a deep-water, open ocean environment, will be generally non-impulsive, with some variability in sound level and frequency, and are not expected to reach permanent or temporary threshold shift values. This analysis assumes that the continuous nature of sounds produced by the drilling rig will provide individual whales with cues relative to the direction and relative distance of the sound source, and the fixed position of the drilling rig will allow for active avoidance of potential physical impacts. Drilling and installation-related sound associated with this project may contribute to increases in the ambient sound environment of the region but are not expected to cause sound-related impacts to Rice's whales. Drilling rig and installation vessel lighting and presence are not expected to impact Rice's whales (BOEM, 2017).

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 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 (**Figure 3**; 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. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) and the amendment in April 2021 (NMFS, 2021a) replaces compliance with the NTL. 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, 2020a, 2021a). 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 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, 2021a).

NTL BOEM 2023-G01 provides additional guidance on Rice's whale protection efforts within the expanded Rice's whale area, inclusive of all areas between the 100 and 400 m isobaths in the northern Gulf of Mexico. These include retaining vessel transit details if transiting within the expanded Rice's whale area, maintaining separation distances, and utilizing Automatic Identification System on vessels 65 ft or greater, among others. When baleen whales are sighted, vessel operators and crews are required to attempt to maintain a distance of 1,640 ft (500 m) or greater whenever possible (NMFS, 2020a, 2021a). Vessel operators are required to reduce vessel speed to 10 knots or less, when safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel. Compliance with these NTLs will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing Rice's whales.

The current PBR level for the Gulf of Mexico stock of Rice's whale is 0.1 (Hayes et al., 2023). Mortality of a single Rice's whale would constitute a significant impact to the population of Rice's whales. However, it is unlikely that Rice's whale occurs within the project area, including the transit corridor for support vessels; consequently, the probability of a vessel collision with this species is extremely low.

Helicopter traffic also has the potential to disturb Rice's whales and 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 100 m (328 ft) of marine mammals (BOEM, 2016a; 2017; NMFS, 2020a). Due to the brief potential for disturbance the low density of Rice's whales in the Gulf of Mexico, no significant impacts are expected.

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by NMFS (2020a) and BOEM (2012a; 2015; 2016b; 2017; 2023a,b). 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 brief duration of a small spill, any impacts are expected to be minimal.

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 at the time of a spill.

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 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

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; 2017; 2023a,b), NMFS (2020a), Geraci and St. Aubin (1990), and 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, sound, and 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 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 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 collisions, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTLs BOEM-2016-G01, BOEM-2023-G01, and NMFS (2020a, 2021a) (see **Table 1**) to reduce the potential for colliding with or disturbing these animals. In the event of oil from a large spill contacting Rice's whales, it is expected that impacts resulting in the injury or death of individual Rice's whales would be significant based on the current PBR level for the Gulf of Mexico subspecies and stock (0.1). Mortality of a single Rice's whale would constitute a significant impact to the population of Rice's whales. The core distribution area for Rice's whales is within the eastern Gulf of Mexico OCS Planning Area; therefore, it unlikely that Rice's whales would occur within the project area.

C.3.3 West Indian Manatee (Threatened)

Most of the Gulf of Mexico manatee population is located in peninsular Florida, but manatees have been seen as far west as Texas during the summer (USFWS, 2001a). A species description is presented in the West Indian manatee recovery plan (USFWS, 2001a). Critical habitat of the West Indian manatee has been designated in southwest Florida.

Manatee sightings in Louisiana have increased as the species extends its presence farther west of Florida in the warmer months (Wilson, 2003). Manatees are typically found in coastal and riverine habitats, but have been seen on rare occasions in deepwater areas, during 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 by PSOs on the OCS during seismic mitigation surveys in mean water depths of over 600 m (1,969 ft) (Barkaszi and Kelly, 2019).

IPFs that may potentially 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 121 statute miles (195 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 collisions, which are identified as a threat in the recovery plan for this species (USFWS, 2001a). 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 collisions, 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 colliding with protected species. NTL 2016-G01 was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL and in an amendment published in April 2021 (NMFS, 2021a). Vessel collision avoidance measures described in NMFS (2020a, 2021a) for the marine mammal species managed by that agency may also provide some additional indirect protections to manatees. If a manatee is sighted, vessels associated with the operation should operate at no wake/idle speed within that area, follow routes in deep water whenever possible, and attempt to maintain a distance of 50 m (164 ft) if practical. This does not apply to any vessel towing gear (e.g., source towed array and site clearance trawling).

Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing manatees during daylight hours. The current PBR level for the Florida subspecies of West Indian manatee is 14 (USFWS, 2014). In the event of a vessel collision during support vessel transits, the mortality of a single manatee would constitute an adverse but insignificant impact to the subspecies.

Helicopter traffic has the potential to disturb manatees and Rathbun (1988) reported that manatees were disturbed more by low-flying 20 to 160 m (66 to 525 ft) helicopters than by fixed-wing aircraft. 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, 2017; NMFS, 2020a, 2021a). This helicopter traffic mitigation measure will minimize the potential for disturbing manatees and results in no expected impacts.

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 30-day OSRA modeling (**Table 4**) indicates nearshore waters and embayments from Matagorda County, Texas to Plaquemines Parish, Louisiana could be affected within 30 days of spill (1% to 3% conditional probability).

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, and 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, 2017). Indirect impacts include stress from the activities and 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 foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event 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 collisions, entanglement, or other injury or stress. Response vessels would be expected to operate in accordance with NTL BOEM-2016-G01 and NMFS (2020a, 2021a) (see **Table 1**) to reduce the potential for colliding with or disturbing these animals. The current PBR level for the Florida subspecies of West Indian manatee is 14 (USFWS, 2014). It is not anticipated that groups of manatees would occur in coastal waters of the north central Gulf of Mexico; therefore, in the event of mortality of individual manatees from a large oil spill would constitute an adverse but insignificant impact to the subspecies.

C.3.4 Non-Endangered Marine Mammals (Protected)

Excluding the three Endangered or Threatened species that have been discussed previously, there are 20 additional species of whales and dolphins (cetaceans) that may be found in the Gulf of Mexico, including dwarf and pygmy sperm whales (*Kogia sima* and *K. breviceps*), 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 (*Stenella attenuata*), spinner dolphin (*S. longirostris*), and bottlenose dolphin (*Tursiops truncatus*). A brief summary is presented below, and additional information on these groups is presented by BOEM (2017).

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

Beaked whales. Four species of beaked whales are known to occur in the Gulf of Mexico: Blainville's beaked whale (*Mesoplodon densirostris*), Sowerby's beaked whale (*M. bidens*), Gervais' beaked whale (*M. europaeus*), and Cuvier's beaked whale (*Ziphius cavirostris*). Stranding records as well as passive acoustic monitoring in the Gulf of Mexico (Hildebrand et al., 2015) suggest that Gervais' beaked whale and Cuvier's beaked whale are the most common species in the region. The Sowerby's beaked whale is considered extralimital, with one documented stranding reported in the Gulf of Mexico by Bonde and O'Shea (1989). There are a number of extralimital strandings and sightings reported beyond the recognized range of Sowerby's beaked whale (e.g., Canary Islands, Mediterranean Sea), including from the eastern

Gulf of Mexico (Pitman and Brownell, 2020). Blainville's beaked whales are rare, with only four documented strandings in the northern Gulf of Mexico (Würsig et al., 2000) and three sightings in the Gulf of Mexico (Hayes et al., 2021).

Due to the difficulties of at-sea identification, beaked whales in the Gulf of Mexico are identified either as Cuvier's beaked whales or are grouped into an undifferentiated species complex (*Mesoplodon* spp.). In the northern Gulf of Mexico, they are broadly distributed in water depths greater than 1,000 m (3,281 ft) over lower slope and abyssal landscapes (Davis et al., 2000; HIdebrand et al., 2015). Any of these species could occur in the project area (Hayes et al., 2022).

Delphinids. Fourteen species of delphinids are known from the Gulf of Mexico, including Atlantic spotted dolphin (*Stenella frontalis*), bottlenose dolphin, 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, pygmy killer whale (*Feresa attenuata*), short-finned pilot whale (*Globicephala macrorhynchus*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), spinner dolphin, and striped dolphin (*Stenella coeruleoalba*). Any of these species could occur in the project area (Hayes et al., 2022).

The bottlenose dolphin is a common inhabitant of the northern Gulf of Mexico, particularly within continental shelf waters. There are two ecotypes of bottlenose dolphins, a coastal form and an offshore form, which are genetically isolated from each other (Waring et al., 2016). The offshore form of the bottlenose dolphin may occur within the project area. Inshore populations of coastal bottlenose dolphins in the northern Gulf of Mexico are separated into 32 geographically distinct population units, or stocks, for management purposes by NMFS (Hayes et al., 2023). The Florida Bay stock was moved from the Western North Atlantic to the Gulf of Mexico demographically independent populations.

IPFs that potentially may affect non-endangered marine mammals include drilling rig and 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 Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

The presence of the drilling rig and installation vessels 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 sound that might otherwise be avoided. Drilling and installation vessel presence and lighting are not considered as IPFs for marine mammals (BOEM, 2017).

If the vessel is 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).

Sound from routine drilling, well completion operations, and installation activities 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 drilling 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 Mexico. Eighteen of the 20 odontocete species are considered to be in the mid-frequency functional hearing group and two species (*Kogia* spp.) are in the high frequency functional hearing group, (NMFS, 2018a). Thruster and drilling sound will affect each group differently depending on the frequency bandwidths produced by operations. Generally, sound produced by drilling rigs on DP is dominated by frequencies below 10 kHz. Thus, drilling rig DP sound sources are out of the audible range for the high frequency group.

For mid frequency cetaceans exposed to a non-impulsive source (like drilling operations), permanent threshold shifts are estimated to occur when the mammal has received an SEL of 198 dB re 1 μPa^2 s over a 24-hour period. Similarly, temporary threshold shifts are estimated to occur when the mammal has received an SEL of 178 dB re 1 μPa^2 s over a 24-hour period. Due to the transient nature of marine mammals and the stationary nature of the proposed activities, it is not expected that any marine mammals will remain within the ensonified area for a full 24-hour period to receive SEL necessary for the onset of auditory threshold shifts.

NMFS (2018a) presents criteria used to determine physiological (i.e., 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. Received SPL of 120 dB re 1 µPa from a non-impulsive, continuous source is considered high enough to elicit a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. 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 Mexico have been exposed to sound 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 drilling activities, this project would represent a small, temporary contribution to the overall soundscape, and any short-term behavioral impacts are not expected to be biologically significant to marine mammal populations. Drilling rig and installation vessel lighting and presence are not identified as IPFs for marine mammals by BOEM (2017).

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. The NTL also requires that operators and crews maintain a vigilant watch for marine mammals and report sightings of any injured or dead protected species. Vessel operators and crews are required to attempt to maintain a distance of 100 m (328 ft) or greater when toothed whales are sighted and 50 m (164 ft) when small cetaceans are sighted (NMFS, 2020a). 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 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) are only applicable to ESA-listed species, complying with them may provide additional indirect protections 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 non-endangered cetacean species in the Gulf of Mexico are less than 3 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., 2022). Mortality of individuals equal to or in excess of their PBR level would constitute a significant impact at a population level to the local (Gulf of Mexico) stocks of these species.

Helicopter traffic has the potential to disturb marine mammals (Würsig et al., 1998) but relatively high-altitude flying is conducted to minimize the potential for disturbances. 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). Maintaining these altitudes during helicopter operations will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2017; NMFS, 2020a).

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by BOEM (2017; 2023a,b). 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 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 sound 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 (2017; 2023a,b). 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 sound 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, e.g.) (BOEM, 2017). 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 collisions, entanglement or other injury, or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for colliding with 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. 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 Mexico that are less than 3 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., 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 Mexico) 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, Kemp's ridley, and hawksbill turtles. As of 6 May 2016, the entire North Atlantic DPS of the green turtle is listed as Threatened (81 FR 20057). The DPS of loggerhead turtles that occurs in the Gulf of Mexico is listed as Threatened.

Critical habitat has been designated for the loggerhead turtle in the Gulf of Mexico as shown in **Figure 4**. Loggerhead turtles in the Gulf of Mexico are part of the Northwest Atlantic Ocean DPS (76 FR 58868). In July 2014, NMFS and the USFWS designated critical habitat for this DPS (NMFS, 2021b). 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 Mexico (and Atlantic Ocean) as critical habitat. *Sargassum* is a brown algae (Class Phaeophyceae) that takes on a planktonic, often epipelagic 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, green, hawksbill, and Kemp's ridley turtles (Witherington et al., 2012). 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, 2021b).

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 218 statute miles (351 km) from the project area. The project area is located within the designated *Sargassum* critical habitat for loggerhead sea turtles (**Figure 4**).

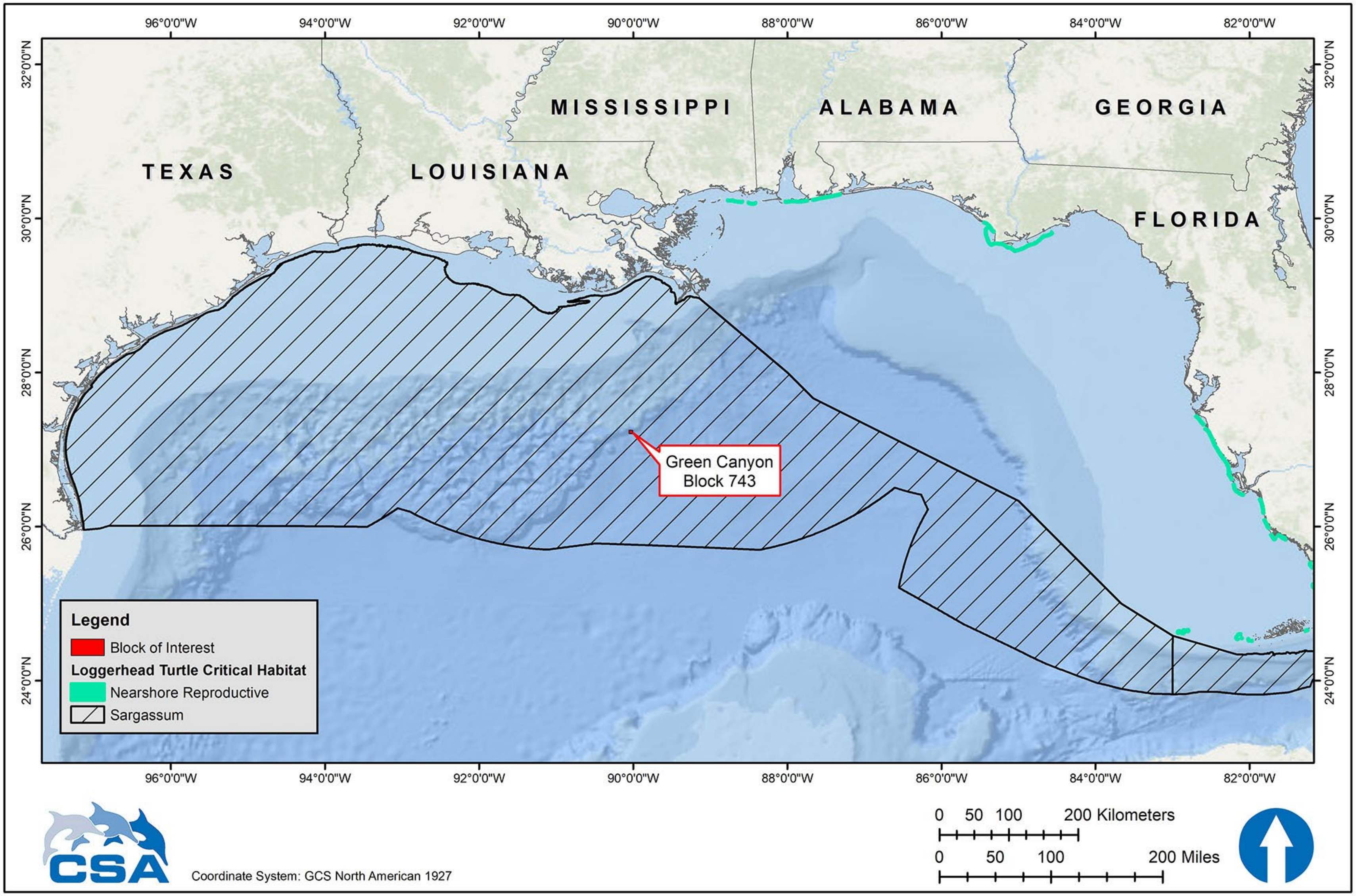

Figure 4. Location of loggerhead turtle designated *Sargassum* critical habitat and nearshore reproductive critical habitat in relation to the project area.

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 habitat for foraging where *Sargassum* is routinely found. All five sea turtle species in the Gulf of Mexico are migratory and use different marine habitats according to their life stage. These habitats include high-energy beaches for nesting females and emerging hatchlings and pelagic convergence zones for hatchling and juvenile turtles. As adults, green, hawksbill, and loggerhead turtles forage primarily in shallow, benthic habitats.

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

- Loggerhead turtles – Loggerhead turtles nest in significant numbers along the Florida Panhandle (Florida Fish and Wildlife Conservation Commission, nd-a) 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, nd-b);
- Leatherback turtles – Leatherback turtles infrequently nest on Florida Panhandle beaches (Florida Fish and Wildlife Conservation Commission, nd-c);
- Kemp's ridley turtles – The critically endangered Kemp's ridley turtle nests almost exclusively on a 16-mile (26-km) stretch of coastline near Rancho Nuevo in the Mexican state of Tamaulipas (NMFS 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). A total of 256 Kemp's ridley turtle nests were counted in Texas in 2023 (Turtle Island Restoration Network, 2023). 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 (USFWS, 2016a).

IPFs that could potentially affect sea turtles include drilling rig and 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 sea turtles due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges.

Although NMFS (2020a) stated marine debris as an IPF, compliance with NTL BSEE 2015-G013 (See Table 1) and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on sea turtles. NMFS (2020a) estimated a small proportion of individual sea turtles would be adversely affected from exposure to marine debris. Therefore, marine debris is likely to have negligible impacts on sea turtles and is not further discussed in this EIA (See **Table 2**).

Impacts of Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

Drilling and 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).

The currently accepted hearing and response estimates for sea turtles are based on work conducted by the U.S. Navy (Finneran et al., 2017). These are applied in the NMFS Biological Opinion (NMFS, 2020a) which uses a zero-to-peak sound pressure level (PK) permanent threshold shift (i.e., acoustic injury) threshold of 232 dB re 1 µPa, and an SEL_{24h} threshold of 204 dB re 1 μPa^2 s. Behavioral thresholds for sea turtles are also based on work by the U.S. Navy (Blackstock et al., 2018) which recommends an SPL threshold of 175 dB re 1 µPa. Based on transmission loss calculations (see Urick, 1983), open water propagation of sound produced by typical sources with DP thrusters in use during drilling, are not expected to produce SPL greater than 175 dB re 1 µPa beyond a few meters from the source. Certain sea turtles, especially loggerheads, may be attracted to offshore structures (Lohoefener et al., 1990; Gitschlag et al., 1997; Colman et al., 2020) and thus may be more susceptible to impacts from sounds produced during routine drilling 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 drilling and 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 (2020a) stated sea turtles have the potential to be entangled or entrapped in moon pools, and although many sea turtles could exit the moon pool under their own volition, sublethal effects could occur. If the vessel is equipped with a moon pool, a trained crew member or company representative will monitor the moon pool area for sea turtles during operations. If a sea turtle is detected in the moon pool, it will be immediately reported to agencies including NMFS, BOEM, and BSEE per NMFS (2020a); compliance with ensuing agency guidance is expected. Resuscitation of any trapped sea turtles is expected to occur in compliance with NMFS (2020a) Appendix J. Based on the moon pool entrapment cases of sea turtles reported and successful rescues and releases that have occurred, NMFS (2020a) estimated approximately about one sea turtle will be sub-lethally entrapped in moon pools every year. Therefore, no significant impacts are 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 Mexico (Lutcavage et al., 1997). While adult sea turtles are visible at the surface during the day and in clear weather, they can be difficult to spot from a moving vessel when resting below the water surface, during nighttime, or during periods of inclement weather. To reduce the potential for vessel 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. 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, 2021). 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). Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing sea turtles.

Sound generated from support helicopter traffic has the potential to disturb sea turtles but relatively high-altitude flying is conducted to minimize the potential for disturbances. While flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. This altitude is intended to minimize the potential for disturbing sea turtles, and no significant impacts are expected (NMFS, 2007; BOEM, 2012a).

Impacts of a Small Fuel Spill

Potential spill impacts on sea turtles are discussed by NMFS (2020a) and BOEM (2017; 2023a,b). 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 Appendix G provides details on spill response measures. Given the open ocean location of the project area, the duration of a small spill would be brief and the potential for impacts to occur would be minimal.

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 sound of response vessels and aircrafts (NMFS, 2020b). 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 218 statute miles (351 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 and degradation.

Loggerhead Critical Habitat – *Sargassum*. The project area is located within the designated *Sargassum* critical habitat for the loggerhead turtles (**Figure 4**). A small diesel fuel spill would likely affect *Sargassum* and juvenile turtles in this habitat. If juvenile sea turtles come into contact with or ingest diesel fuel, impacts could include death, injury, or other sublethal effects. However, effects of a small spill on *Sargassum* critical habitat for loggerhead turtles would be limited to the small area (0.5 to 5 ha [1.2 to 12 ac]) likely to be impacted by a small spill. An impact area of 5 ha (12 ac) would represent a negligible portion of the approximately 40,662,810 ha (100,480,000 ac) designated *Sargassum* critical habitat for loggerhead turtles in the northern Gulf of Mexico. However, if juvenile sea turtles are present in the area impacted, significant 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, and 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, 2020a). 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 modeling (**Table 4**) indicates nearshore waters and embayments from Matagorda County, Texas to Plaquemines Parish, Louisiana could be affected within 30 days of a spill (1% to 3% conditional probability).

Loggerhead Critical Habitat – *Sargassum*. The project area is located within the designated *Sargassum* critical habitat for the loggerhead turtles which includes most of the Western and Central Planning Areas in the Gulf of Mexico and parts of the southern portion of the Eastern Planning Area (**Figure 4**) (NMFS, 2021b). 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 Mexico being oiled. The 2010 *Deepwater Horizon* spill affected approximately one-third of the *Sargassum* habitat in the northern Gulf of Mexico (BOEM, 2014a). It is extremely unlikely that the entire *Sargassum* critical habitat would be affected by a large spill. Because *Sargassum* is a floating, pelagic species, it would only be affected by impacts that occur near the surface.

The effects of oiling on *Sargassum* vary with spill severity, but moderate to heavy oiling that could occur during a large spill could cause complete mortality to floating *Sargassum* and its associated communities (BOEM, 2017). *Sargassum* 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 affects, including a reduction in growth, productivity, and recruitment of organisms associated with the *Sargassum.* The *Sargassum* algae itself could be less impacted by light to moderate oiling than associated organisms because of a waxy outer layer that might help protect it from oiling (BOEM, 2016b). *Sargassum* has a yearly seasonal cycle of growth and a yearly cycle of migration from the Gulf of Mexico to the western Atlantic. A large spill could affect a large portion of the annual crop of the algae; however, because of its ubiquitous distribution and seasonal cycle, recovery of the *Sargassum* community would be expected to occur within one to two years (BOEM, 2017).

Impacts to sea turtles from a large oil spill and associated cleanup activities would depend on spill extent, duration, and season (relative to turtle nesting season); the amount of oil reaching the shore; the importance of specific beaches to sea turtle nesting; and the level of cleanup vessel and beach crew activity required. In the event of oil from a large spill, it is expected that impacts resulting in the injury or death of individual sea turtles would be adverse but not likely significant at the population level. In the event that spilled oil reached nesting beaches during nesting period(s), the level of mortality (and impact) would increase.

C.3.6 Piping Plover (Threatened)

The Piping Plover is a migratory shorebird that overwinters along the southeastern U.S. and Gulf of Mexico 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 (BirdLife International, 2020). Critical overwintering habitat has been designated, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida (**Figure 3**). 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.

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**). Sound 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 126 statute miles (203 km) from the nearest shorelines designated as critical habitat for the Piping Plover (**Figure 3**). The 30-day OSRA modeling (**Table 4**) predicts that Piping Plover critical habitat in Texas and Louisiana could be contacted within 30 days of a spill (1% to 3% conditional probability).

Plovers could physically oil themselves while foraging on oiled shores or secondarily contaminate themselves through ingestion of oiled intertidal sediments and prey (BOEM, 2017). 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 bp resources will be available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the ROSRP.

However, a large spill that contacts shorelines would not necessarily substantially impact Piping Plovers. In the aftermath of the *Deepwater Horizon* incident, Gibson et al. (2017) completed thorough surveys of coastal Piping Plover habitat in coastal Louisiana, Mississippi, and Alabama and found that only 0.89% of all observed Piping Plovers were visibly oiled, leaving the authors to conclude that the *Deepwater Horizon* incident did not substantially affect Piping Plover populations.

C.3.7 Whooping Crane (Endangered)

The Whooping Crane is a large omnivorous wading bird listed as an Endangered species. Three wild populations live in North America (National Wildlife Federation, nd). 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 an estimated population of 536 at Aransas NWR during the 2022 to 2023 winter (USFWS, 2023a), a slight decrease from an estimated 543 individuals counted in the 2021 to 2022 winter survey. 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 of the project area 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 to natural dispersion and degradation.

Impacts of a Large Oil Spill

A large oil spill is unlikely to affect Whooping Cranes as the project area is approximately 399 statute miles (642 km) from the Aransas NWR, which is the nearest designated critical habitat. The 30-day OSRA modeling (**Table 4**) predicts <0.5% or less chance of oil contacting Whooping Crane critical habitat in Texas within 30 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 bp resources will be available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the ROSRP.

C.3.8 Black-capped Petrel (Endangered)

The Black-capped Petrel is a pelagic seabird that solely nests 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 Mexico. While the Gulf of Mexico is not their primary foraging grounds, the most recent species status review (USFWS, 2023b) reported 11 sightings in the Gulf of Mexico in 2017-2018 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 drilling rig and installation vessel presence, marine sound, lighting, 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 Drilling Rig and Installation Vessel 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 drilling rig or 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 limited scope and short duration of drilling and installation activities described in this DOCD and the low density of Black-capped Petrels in the Gulf of Mexico, 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. 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 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, 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.

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 (USFWS, 2023), 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, 2018a). 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 (USFWS, 2023).

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 Mexico, significant impacts on this species from a large spill is considered unlikely.

C.3.9 Oceanic Whitetip Shark (Threatened)

The oceanic whitetip shark was listed as Threatened under the ESA on 30 January 2018 (effective 30 March 2018) by NMFS (83 FR 4153). Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude, and historically were one of the most widespread and abundant species of shark (Rigby et al., 2019). However, based on reported oceanic whitetip shark catches in several major long-line 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 Mexico (Rigby et al., 2019).

Oceanic whitetip shark management is complicated due to it being globally distributed, highly migratory, and overlapping in areas of high fishing pressure; thus, leaving assessment of population trends on fishery dependent catch-and-effort data rather than scientific surveys (Young and Carlson, 2020). A comparison of historical shark catch rates in the Gulf of Mexico by Baum and Myers (2004) noted that most recent papers dismissed the oceanic whitetip shark as rare or absent in the Gulf of Mexico. NMFS (2023) noted that there has been an 88% decline in abundance of the species in the Gulf of Mexico since the mid-1990s due to commercial fishing pressure.

IPFs that could affect the oceanic whitetip shark include drilling rig and installation vessel presence, sound, and lights, and a large oil spill. Although NMFS (2020a) 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 Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

Offshore drilling and installation activities produce a broad array of sound 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 µPa in nurse sharks (*Ginglymostoma cirratum*) at frequencies between 100 and 1,000 Hz (Casper and Mann, 2006). These frequencies overlap with sound associated with drilling activities (source levels of 195 dB re 1 µPa m with peak frequencies at 40 to 100 Hz) (Hildebrand, 2005). Impacts from offshore drilling and installation activities (i.e., non-impulsive sound) could include masking or behavioral changes (Popper et al., 2014). However, because of the limited propagation distances of high SPLs from the drilling rig or installation vessels, impacts would be limited in geographic scope. It is anticipated that animals would move away from the static sound source and avoid auditory injury or disturbances. Therefore, no population level impacts on oceanic whitetip sharks are expected.

Impacts of a Large Oil Spill

Information regarding the direct effects of oil on elasmobranchs, including the oceanic whitetip shark are largely unknown. However, in the event of a large oil spill, oceanic whitetip sharks could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Because oceanic whitetip sharks may be found in surface waters, they could be more likely to be impacted by floating oil than other species which only reside at depth.

It is possible that a large oil spill could affect individual oceanic whitetip sharks and result in injuries or deaths. However, due to the low density of oceanic whitetip sharks thought to exist in the Gulf of Mexico, it is unlikely that a large spill would result in population level effects.

C.3.10 Giant Manta Ray (Threatened)

The giant manta ray is a Threatened elasmobranch species that is a slow-growing, migratory, planktivorous species than inhabits tropical, subtropical, and temperate bodies of water worldwide (NOAA, 2023b). The giant manta ray became listed as Threatened under the ESA in 2018.

Commercial fishing is the primary threat to giant manta rays (NOAA, 2023b). 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, 2023b). Stewart et al. (2018) recently reported that the Flower Garden Banks serves as nursery habitat for aggregations of juvenile manta rays. Approximately 100 unique individuals have been positively identified at the Flower Garden Banks based on unique underbelly coloration (Belter et al., 2020). 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 drilling rig and installation vessel presence, marine sound, and lights, and a large oil spill. Although NMFS (2020a) 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 Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

Offshore drilling and installation activities produce a broad array of sound 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 µPa in yellow stingray (*Urobatis jamaicensis*) and SPLs between approximately 120 and 145 dB re 1 µPa 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 drilling activities (source levels of 195 dB re 1 µPa m with peak frequencies at 40 to 100 Hz) (Hildebrand, 2005). Impacts from offshore drilling and installation activities (i.e., non-impulsive sound) could include masking or behavioral changes (Popper et al., 2014). However, because of the limited propagation distances of high SPLs from the drilling rig, impacts would be limited in geographic scope. It is anticipated that animals would move away from the static sound source and avoid auditory injury or disturbances. Therefore, 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 Mexico, 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 typically feed in shallow waters of less than 10 m (33 ft) depth (NOAA, 2023b). Because of this shallow water feeding behavior, giant manta rays would be more likely to be impacted by floating oil than other species which most typically reside at depth.

In the event of a large oil spill, due to the distance between the project area and the Flower Garden Banks, 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 Mexico, there would not likely be any population-level impacts.

C.3.11 Gulf Sturgeon (Threatened)

The Gulf sturgeon is a Threatened fish species that inhabits major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida (Barkuloo, 1988; Wakeford, 2001). Sturgeon are anadromous fish that migrate from the 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 3**). A species description is presented by BOEM (2012a) and in the recovery plan for this species (USFWS et al., 1995).

A large oil spill is the only IPF that potentially may affect Gulf sturgeon. There are no IPFs associated with routine project activities that could affect these fish. A small fuel spill in the project area would be unlikely to affect Gulf sturgeon because a small fuel spill would not be expected to make landfall or reach coastal waters prior to 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 (2020a) estimated one non-lethal Gulf sturgeon collision in the 50 years of proposed action.

Impacts of a Large Oil Spill

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

The project area is approximately 210 statute miles (338 km) from the nearest Gulf sturgeon critical habitat. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 30 days of a spill.

In the event of oil reaching Gulf sturgeon habitat, the fish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Based on the life history of this species, subadult and adult Gulf sturgeon would be most vulnerable to an estuarine or marine oil spill, and would be vulnerable from approximately October through April when this species is foraging in estuarine and shallow marine habitats (NMFS, 2020a).

C.3.12 Nassau Grouper (Threatened)

The Nassau grouper is a Threatened, long-lived reef fish typically associated with hard bottom structures such as natural and artificial reefs, rocks, and underwater ledges (NOAA Fisheries, 2024). Once one of the most common reef fish species in the coastal waters of the United States and Caribbean (Sadovy, 1997), the Nassau grouper been subject to overfishing and is considered extinct 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 (NOAA, 2024a). The Nassau grouper was listed as Threatened under the ESA in 2016 (81 FR 42268). In 2024, NMFS designated critical habitat for the Nassau grouper, which includes area near the Dry Tortugas and the Florida Keys in the Gulf of Mexico.

Nassau groupers are found mainly in the shallow tropical and subtropical waters of eastern Florida, the Florida Keys, Bermuda, the Yucatán Peninsula, and the Caribbean, including the

U.S. Virgin Islands and Puerto Rico within water depths up to 130 m (426 ft) (NOAA, 2024a). There has been one confirmed sighting of Nassau grouper from the Flower Garden Banks in the Gulf of Mexico 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 oil spill is the only relevant IPF.

Impacts of a Large Oil Spill

A spill would be unlikely to contact the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 220 statute miles [354 km]), and the difference in water depth between the project area (2,081 m [6,828 ft]) and the Banks (approximately 17 to 145 m [56 to 476 ft]). While on the surface, hydrocarbons would not be expected to contact subsurface fish.

In the unlikely event that hydrocarbons contact 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.3.13 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 (NOAA Fisheries, 2023). Once found along most of the northern Gulf of Mexico coast from Texas to Florida, their current range in Gulf of Mexico is restricted to areas primarily in southwest Florida (Brame et al., 2019) where several areas of critical habitat have been designated (**Figure 3**). 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, 2018b), 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 476 statute miles (766 km) from the nearest smalltooth sawfish critical habitat in Charlotte County, Florida. Based on the 30-day OSRA modeling (**Table 4**), coastal areas containing smalltooth sawfish critical habitat are unlikely to be affected within 30 days of a spill (<0.5% conditional probability).

Information regarding the direct effects of oil on elasmobranchs, including the smalltooth sawfish 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. In the event of oil reaching smalltooth sawfish habitats, the smalltooth sawfish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills as well as impaired olfactory function. 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.3.14 Beach Mice (Endangered)

Four subspecies of Endangered beach mouse occur on the barrier islands of Alabama and the Florida Panhandle: the Alabama (*Peromyscus polionotus ammobates*), Choctawhatchee (*P. p. allophrys*), Perdido Key (*P. p. trissyllepsis*), and St. Andrew beach mouse (*P. p. peninsularis*). Critical habitat has been designated for all four subspecies and is shown combined in **Figure 3**. One additional subspecies of *Peromyscus* beach mouse inhabiting dunes on the western Florida Panhandle, the Santa Rosa beach mouse (*P. p. leucocephalus*), 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 Endangered beach mice are discussed by BOEM (2017; 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 237 statute miles (381 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% conditional probability of contacting any coastal areas containing beach mouse critical habitat within 30 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.3.15 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 Suwanee National Wildlife Refuge in Dixie County, Florida (Florida Fish and Wildlife Conservation Commission, nd-e). 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 427 statute miles (687 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% or less conditional probability of contacting any coastal areas containing Florida salt marsh vole habitat within 30 days.

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.3.16 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, Florida is approximately 327 miles (526 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5 conditional probability of contacting any coastal areas containing Panama City crayfish critical habitat within 30 days.

Effects of oiling on the Panama City crayfish are largely unknown. In general, crayfishes use chemoreception to orient themselves in their environmental, 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.3.17 Threatened Coral Species

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral, staghorn coral, lobed star coral, mountainous star coral, boulder star coral, pillar coral, and rough cactus coral. 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, 2023a), but are unlikely to be present with a widespread distribution in the northern Gulf of Mexico because they typically inhabit coral reefs in shallow, clear tropical, or subtropical waters. Staghorn coral, pillar coral, and rough cactus coral are only known from the Florida Keys and Dry Tortugas (Florida Fish and Wildlife Conservation Commission, nd-d). 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. Critical habitat has been designated for elkhorn coral and staghorn coral in the Florida Keys (Monroe County, Florida) and Dry Tortugas. A species description of elkhorn coral is presented in the recovery plan for the species (NMFS, 2015).

NMFS has designated critical habitat for the boulder star coral, lobed star coral, mountainous star coral, pillar coral, and rough cactus coral in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea per 88 FR 54026 and became effective in September 2023. For the areas in the Gulf of Mexico, this includes the Flower Garden Banks and the waters near Miami-Dade and Monroe counties, Florida, and the Dry Tortugas (**Figure 3**).

There are no IPFs associated with routine project activities that could affect threatened corals in the northern Gulf of Mexico. A small fuel spill would not affect threatened coral species because the oil would float and dissipate on the sea surface. A large oil spill is the only relevant IPF.

Impacts of a Large Oil Spill

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 220 statute miles [354 km]), and the difference in water depth between the project area (2,081 m [6,828 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 remote 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. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf. 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 a subsurface plume reached reefs at the Flower Garden Banks or other Gulf of Mexico reefs, oil droplets or oiled sediment particles could come into contact with reef organisms or corals. As discussed by BOEM (2017), impacts relevant to these corals could include loss of habitat, biodiversity, and live coral coverage. Sub-lethal effects could be long-lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature and diseases) (BOEM, 2017).

Due to the distance between the project area and coral habitats, there is a low chance of oil contacting Threatened coral critical habitat in the event of a spill, and no significant impacts on threatened coral species are expected.

C.3.18 Queen Conch (Threatened)

The Queen conch is a large gastropod that occurs throughout the Caribbean Sea, Gulf of Mexico, and Bermuda which was listed as Threatened under the ESA in 2024 (NOAA, 2024b). 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 meters 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 Mexico, 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 other than the Black-capped Petrel (see **Section C.3.8**) are likely to occur at the project area due to the distance from shore. For a discussion of shorebirds and coastal nesting birds, see **Section C.4.2**.

Seabirds of the northern Gulf of Mexico were surveyed from ships during the GulfCet II program (Davis et al., 2000) which reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in deepwater areas of the Gulf of Mexico. 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 [*Onychoprion fuscatus*], Least Tern [*Sternula antillarum*], Sandwich Tern [*Thalasseus sandvicensis*], Magnificent Frigatebird [*Fregata magnificens*]); winter residents (gannets, gulls, jaegers); and permanent resident species (Laughing Gulls [*Leucophaeus atricilla*], Royal Terns [*Thalasseus maximus*], Bridled Terns [*Onychoprion anaethetus*]) (Davis et al., 2000).

Common marine bird species include Wilson's Storm-Petrel (*Oceanites oceanicus*), Magnificent Frigatebird, Northern Gannet (*Morus bassanus*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Cory's Shearwater (*Calonectris borealis*), 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}.

IPFs that potentially may affect marine birds include drilling rig and installation vessel presence, marine sound, lighting, support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges permitted under the NPDES are likely to have negligible impacts on the birds due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these animals. Compliance with

NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on birds. The IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

Marine birds that frequent offshore oil and gas vessels 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). Mortality of migrant birds at tall towers and other land-based structures has been reviewed extensively, and the mechanisms involved in rig collisions appear to be similar. In some cases, migrants simply do not see a part of the rig until it is too late to avoid it. In other cases, navigation may be disrupted by marine sound (Russell, 2005). On the other hand, offshore structures are suitable stopover perches for most trans-Gulf migrant species, and most of the migrants that stop over on rigs probably benefit from their stay, particularly in spring (Russell, 2005). Due to the limited scope and short duration of drilling and installation 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 Mexico also noted the phenomenon but did not recommend mitigation (Russell, 2005). One factor to consider in evaluating this impact in the Gulf of Mexico would include the lower incidence of cloudy and foggy days in the Gulf of Mexico 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 drilling rig and installation vessel lighting, sound, collisions, or other adverse effects are highly localized and may affect individual birds during migration periods. Sound generated from the drilling rig or installation vessels is not expected to impact marine birds. Therefore, these potential impacts are not expected to affect marine birds at the population or species level and are not significant.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb marine birds 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 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 (2017). 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 detail on spill response measures. Given the open ocean location of the project area and the expected short duration of a small fuel spill, the potential exposure period for 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.

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, minimal if any 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 (2017). 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 seabirds in the deepwater Gulf of Mexico (>200 m). Haney et al. (2014) estimated that seabird densities over the open ocean were approximately 1.6 birds km^{-2}. The number of pelagic birds that could be affected in open, offshore waters would depend on the extent and persistence of the oil slick.

Data following the *Deepwater Horizon* incident provides 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 pelagic species such as the Northern Gannet, Magnificent Frigatebird, and Masked Booby. 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, 2018a).

C.4.2 Coastal Birds

Threatened and Endangered bird species (Piping Plover, Whooping Crane, and Black-capped Petrel) have been discussed previously in **Sections C.3.6**, **C.3.7**, and **C.3.8**. The western Gulf of Mexico (in the US EEZ from Texas to Mississippi) is also a known wintering area for the Threatened Rufa Red Knot (USFWS, nd). 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 (*Thalasseus sandvicensis*), Wilson's Plover (*Charadrius wilsonia*), Black Skimmer (*Rynchops niger*), Forster's Tern (*Sterna forsteri*), Gull-Billed Tern (*Gelochelidon nilotica*), Laughing Gull, Least Tern, and Royal Tern. Additional information is presented by BOEM (2017).

The Eastern Brown Pelican was delisted from federal Endangered status in 2009 (USFWS, 2016b) and was delisted from state species of special concern status by the State of Florida in 2017 (Florida Fish and Wildlife Conservation Commission, 2021) and Louisiana (Louisiana Wildlife and Fisheries, 2020). However, this species remains listed as endangered by the state of Mississippi (Mississippi Natural Heritage Program, 2018). 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).

The Bald Eagle was delisted from its Threatened status in the lower 48 states on 28 June 2007, but still receives protection under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act of 1940. The Bald Eagle is a terrestrial raptor widely distributed across the southern U.S., including coastal habitats along the Gulf of Mexico. The Gulf Coast is inhabited by both wintering migrant and resident Bald Eagles (Johnsgard, 1990; Ehrlich et al., 1992).

IPFs that potentially may affect shorebirds and coastal nesting birds include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect shorebirds or coastal nesting birds, as the project area is 121 statute miles (195 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 expected to minimize the potential for marine debris-related impacts on shorebirds.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters will transit coastal areas near Port Fourchon and Houma, Louisiana, where shorebirds and coastal nesting birds may be found. These activities could periodically disturb individuals or groups of birds within coastal habitats (e.g., wetlands that may support feeding, resting, or breeding birds).

Vessel traffic may disturb some foraging and resting birds with flushing distances varying among species and among individuals (Rodgers and Schwikert, 2002; Schwemmer et al., 2011; Mendel et al., 2019). The disturbances will be limited to flushing birds away from vessel pathways; known distances are from 20 to 49 m (65 to 160 ft) for personal watercrafts and 23 to 58 m (75 to 190 ft) for outboard-powered boats (Rodgers and Schwikert, 2002). Support vessels will not approach nesting or breeding areas on the shoreline, so disturbances to nesting birds, eggs, and chicks is not expected. Vessel operators are expected to use designated navigation channels and comply with posted speed and wake restrictions while transiting sensitive inland waterways. Due to the limited scope and short duration of drilling and 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 (Efroymson et al., 2003). Helicopters seem to cause the most intense responses over other human disturbances (Bélanger and Bédard, 1989; Rojek et al., 2008; Fuller et al., 2018). 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-feet altitude minimum is greater than the distance (slant range) at which aircraft overflights have been reported to cause behavioral effects on most species of birds studied by Efroymson et al. (2000). 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. The potential impacts from helicopter traffic are not expected to be significant to coastal 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 in Texas and Louisiana a could be contacted within 30 days (1% to 3% conditional probability).

Coastal birds can be exposed to oil as they float on the water surface, dive during foraging, or wade in oiled coastal waters. 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, 2017). Bird eggs may be damaged if an oiled adult sits on the nest.

Brown and White Pelicans (*Pelecanus erythrorhynchos*) 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, 2017).

Coastal fishing birds of prey such as bald eagles, ospreys (*Pandon haliaetus*), 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, 2017). It is expected that impacts to coastal birds from a large oil spill resulting in the death of individual birds would be adverse but not significant at population levels.

C.5 Fisheries Resources

C.5.1 Pelagic Communities and Ichthyoplankton

Biggs and Ressler (2000) reviewed the biology of pelagic communities in the deepwater environment of the northern Gulf of Mexico. The biological oceanography of the region is dominated by the influence of the Loop Current, whose surface waters are among the most oligotrophic in the world's oceans. Superimposed on this low-productivity condition is productive "hot spots" associated with entrainment of nutrient-rich Mississippi River water and mesoscale oceanographic features. Anticyclonic and cyclonic hydrographic features play an important role in determining biogeographic patterns and controlling primary productivity in the northern Gulf of Mexico (Biggs and Ressler, 2000).

Most fishes inhabiting shelf or oceanic waters of the Gulf of Mexico have planktonic eggs and larvae (Ditty, 1986; Ditty et al., 1988; Richards et al., 1989; Richards et al., 1993). A study by Ross et al. (2012) on midwater fauna to characterize vertical distribution of mesopelagic fishes in selected deepwater areas in the Gulf of Mexico substantiated high species richness but general domination by relatively few families and species.

IPFs that potentially may affect pelagic communities and ichthyoplankton include drilling rig and 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 Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

The drilling rig and installation vessels, as floating structures in the deepwater environment, will act as fish aggregating devices (FADs). In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990; Higashi, 1994; Relini et al., 1994). Positive fish associations with offshore rigs and platforms in the Gulf of Mexico are well documented (Gallaway and Lewbel, 1982; Wilson et al., 2003; 2006; Edwards and Sulak, 2006). The FAD effect could possibly enhance the feeding of epipelagic predators by attracting and concentrating smaller fish species. Drilling rig and installation vessel sound 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 non-impulsive sound 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 an SPL threshold level of 170 dB re 1 µPa over a 48-hour period for onset of recoverable injury and 158 dB re 1 µPa over a 12-hour period for onset temporary auditory threshold shifts. However, no consistent behavioral thresholds for fish resulting from non-impulsive sound have been established (Hawkins and Popper, 2014) and the current recommended behavioral threshold for fish is SPL of 150 dB re 1 µPa defined by the Fisheries Hydroacoustic Working Group (2008) for impulsive sound sources. Sound 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 aggregation is likely to occur to some degree due to the presence of the drilling rig and installation vessels, but the impacts would be limited in geographic scope and no population level impacts are expected.

Few data exist regarding the impacts of sound 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 sound (Popper et al., 2014). Larval fish were experimentally exposed to simulated impulsive sounds by Bolle et al. (2012). The controlled playbacks produced SEL_{24h} of 206 dB re 1 μPa^2 s but resulted in no increased mortality between the exposure and control groups. Non-impulsive sound sources (such as drilling and installation operations) are expected to be far less injurious than impulsive sound. Because of the periodic and transient nature of ichthyoplankton, they are not expected to remain in proximity to the source for a full 24-hour period to receive above-threshold sound, and no impacts to these life stages are expected.

Impacts of Effluent Discharges

Muds and cuttings discharges may have a slight effect on the benthic environment near the wellsite, including a localized increase in water turbidity, the limited blanketing of seafloor sediments, and slightly increased concentrations of hydrocarbons and metals. Treated cuttings are monitored for visible sheen prior to discharge. Contaminants released into the water column will be diluted rapidly within the open ocean environment. Minimal impacts on pelagic communities are anticipated.

Treated sanitary and domestic wastes may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. These wastes may have elevated levels of nutrients, organic matter, and chlorine, but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on 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 pelagic communities.

Impacts of Water Intake

Seawater may be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig and installation vessels. The intake of seawater for cooling water will entrain plankton, though per the NPDES permit GMG290000, the linear velocities should be less than 5 ft $second^{-1}$. The low intake velocity should allow most strong-swimming juvenile fishes and smaller adults to escape entrainment or impingement (Electric Power Research Institute, 2000). However, drifting plankton would not be able to escape entrainment with the exception of a few fast-swimming larvae of certain taxonomic groups. Those organisms entrained may be stressed or killed (Cada, 1990; Mayhew et al., 2000), primarily through changes in water temperature during the route from cooling intake structure to discharge structure and mechanical damage (turbulence in pumps and condensers). The cooling water systems and operating procedures are designed such that a maximum return temperature of the seawater being discharged back into the ocean does not exceed 120°F; thus, minimizing the chance that plankton will be stressed/killed. Due to the limited scope and short duration of drilling and installation activities, any short-term impacts of entrainment are not expected to be significant to plankton or ichthyoplankton populations (BOEM, 2017). The drilling rig and installation vessels ultimately chosen for this project is expected to be in compliance with all cooling water intake requirements including NPDES permit GMG290000.

Impacts of a Small Fuel Spill

Potential spill impacts on fisheries resources are discussed by BOEM (2017). 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 detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill will be brief and the potential for impacts to occur would be minimal.

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 dissipate 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. Determining the impact of a diesel spill on phytoplankton is a complex issue as some phytoplankton species are more tolerant of oil exposure than others (Ozhan et al., 2014). Phytoplankton populations can change quickly on small temporal and spatial scales, making it difficult to predict how a phytoplankton community as a whole will respond to an oil spill. 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 (2017). 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. 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).

Oil spill impacts to phytoplankton include changes in community structure and increases in biomass, which have been attributed to the effects of oil contamination and of decreased predation due to zooplankton mortality (Abbriano et al., 2011; Ozhan et al., 2014). Ozhan et al. (2014) reported that the formation of oil films on the water surface can limit gas exchange through the air-sea interface and can reduce light penetration into the water column which will limit phytoplankton photosynthesis.

Mortality of zooplankton has been shown to be positively correlated with oil concentrations (Lennuk et al., 2015). Spills that are not immediately lethal can have short- or long-term impacts on biomass and community composition, behavior, reproduction, feeding, growth and development, immune response and respiration (Harvell et al., 1999; Wootton et al., 2003; Auffret et al., 2004; Hannam et al., 2010; Bellas et al., 2013; Blackburn et al., 2014). Zooplankton are especially vulnerable to acute oil pollution, showing increased mortality and sublethal changes in physiological activities (e.g., egg production; Moore and Dwyer, 1974; Linden, 1976; Lee et al., 1978; Suchanek, 1993). Bioaccumulation of hydrocarbons can lead to additional impacts among those higher trophic level consumers that rely on zooplankton as a food source (Almeda et al., 2013; Blackburn et al., 2014).

Planktonic communities have a high capacity for recovery from the effects of oil spill pollution due to their short life cycle and high reproductive capacity (Abbriano et al., 2011). Planktonic communities drift with water currents and recolonize from adjacent areas. Because of these attributes, plankton usually recover relatively rapidly to normal population levels following hydrocarbon spill events. Research in the aftermath of the *Deepwater Horizon* incident found that phytoplankton population recovered within weeks to months and zooplankton populations may have only been minimally affected (Abbriano et al., 2011).

C.5.2 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, federal agencies are required to consult on activities that may adversely affect EFH designated in Fishery Management Plans developed by the regional Fishery Management Councils.

The Gulf of Mexico Fishery Management Council (GMFMC) has prepared Fishery Management Plans for corals and coral reefs, shrimps, Caribbean spiny lobster (*Panulirus argus*), reef fishes, coastal migratory pelagic fishes, and red drum (*Sciaenops ocellatus*). In 2005, the EFH for these managed species was redefined in Generic Amendment No. 3 to the various Fishery Management Plans (GMFMC, 2005). The EFH for most of these GMFMC-managed species is on the continental shelf in waters shallower than 183 m (600 ft). The shelf edge is the outer boundary for coastal migratory pelagic fishes, reef fishes, and shrimps. EFH for corals and coral reefs includes some shelf-edge topographic features on the Texas-Louisiana OCS located approximately 62 statute miles (100 km) from the project area (**Figure 3**).

Highly migratory pelagic fishes, which occur as transients in the project area, are the only remaining group for which EFH has been identified in the deepwater Gulf of Mexico. Species in this group, including tunas, swordfishes, billfishes, and sharks, are managed by NMFS. **Table 7** lists the highly migratory fish species and their life stages with EFH at or near the project area.

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna (*Thunnus thynnus*), and (NMFS, 2009c) has designated a Habitat Area of Particular Concern (HAPC) for this species. The HAPC covers much of the deepwater Gulf of Mexico, including the project area (**Figure 3**). The areal extent of the HAPC is approximately 300,000 km^2 (115,831 mi^2). Atlantic bluefin tuna follow an annual cycle of foraging in June through March off the eastern U.S. and Canadian coasts, followed by migration to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009c). 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 (GMFMC, 2005). One of the most significant proposed changes in this amendment reduced the extent of EFH relative to the 1998 Generic Amendment by removing the EFH description and identification from waters between 100 fathoms and the seaward limit of the Exclusive Economic Zone (EEZ). The Highly Migratory Species Fisheries Management Plan was amended in 2009 to update EFH and HAPC to include the bluefin tuna spawning area (NMFS, 2009c).

Table 7. Migratory fish species with designated Essential Fish Habitat (EFH) at or near Green Canyon Block 743, including life stage(s) potentially present within the project area.

Common Name	Scientific Name	Life Stage(s) Potentially Present Within or Near the Project Area
Atlantic bluefin tuna	*Thunnus thynnus*	Spawning, eggs, larvae, adults
Bigeye thresher shark	*Alopias superciliosus*	All
Bigeye tuna	*Thunnus obesus*	Juveniles, adults
Blue marlin	*Makaira nigricans*	Juveniles, adults
Longbill spearfish	*Tetrapturus pfluegeri*	Juveniles, adults
Longfin mako shark	*Isurus paucus*	All
Oceanic whitetip shark	*Carcharhinus longimanus*	All
Silky shark	*Carcharhinus falciformis*	All
Skipjack tuna	*Katsuwonus pelamis*	Spawning, adults
Swordfish	*Xiphias gladius*	Larvae, juveniles, adults
Whale shark	*Rhincodon typus*	All
White marlin	*Tetrapturus albidus*	Juveniles, adults
Yellowfin tuna	*Thunnus albacares*	Spawning, juveniles, adults

NTLs 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 Mexico 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 to protect corals and coral reefs have been identified by the GMFMC (2005). These include the Florida Middle Grounds, Madison-Swanson Marine Reserve, Tortugas North and South Ecological Reserves, Pulley Ridge, and several individual reefs and banks of the northwestern Gulf of Mexico. Other than the Bluefin tuna HAPC, Jakkula Bank is the HAPC located nearest to the project area (approximately 104 statute miles [167 km]).

IPFs that potentially may affect EFH include drilling rig and 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 Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

The drilling rig and installation vessels, as floating structures in the deepwater environment, will act as FADs with most pronounced effects on epipelagic fishes that include species with EFH designation (Holland, 1990; Higashi, 1994; Relini et al., 1994; Gates et al., 2017). The FAD effect would likely attract and concentrate smaller fish species and thus enhance feeding of epipelagic predators.

Drilling rig sound could potentially cause acoustic masking for fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014). Sound 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). The only defined acoustic threshold levels for non-impulsive sound are given by Popper et al. (2014) and apply only to species of fish with swim bladders, including some species with EFH designation, that provide some hearing (pressure detection) function. Popper et al. (2014) recommended SPL threshold levels of 170 dB re 1 µPa over a 48-hour period for onset of recoverable injury and an SPL threshold of 158 dB re 1 µPa over a 12-hour period for onset temporary auditory threshold shifts. No consistent behavioral thresholds for fish resulting from non-impulsive sound have been established (Hawkins and Popper, 2014) and the current recommended behavioral threshold for fish is SPL of 150 dB re 1 µPa defined by the Fisheries Hydroacoustic Working Group (2008) for impulsive sound sources. Because the drilling rig and installation vessels are temporary structures, 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 drilling muds and cuttings, treated sanitary and domestic wastes, deck drainage, and miscellaneous discharges such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water. Impacts on water quality have been discussed previously. No 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 drilling activities, any short-term impacts on EFH for highly migratory pelagic fishes are not expected to be biologically significant. The multisale EIS (BOEM, 2017) 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 localized and brief (BOEM, 2014a).

Impacts of a Small Fuel Spill

Potential spill impacts on EFH are discussed by BOEM (2017). 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 would be brief and the potential for impacts to EFH minimal.

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 produce short-term impact on water quality in the HAPC for spawning bluefin tuna, which covers much of the deepwater Gulf of Mexico. The areal extent of impact from a small fuel spill would represent a negligible portion of the HAPC.

A small fuel spill would not likely affect EFH for corals and coral reefs, the nearest EFH being the topographic features located approximately 62 statute miles (100 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 (2017; 2023a,b). 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 Mexico (Gulf of Mexico Fishery Management Council, 2005; NMFS, 2009c), some impact from a large oil spill 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 consequentially on 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, 2009c). A large spill could temporarily degrade the HAPC due to increased hydrocarbon concentrations in the water column, with the potential for lethal or sublethal impacts on spawning tuna. Potential impacts would depend in part on the timing of a spill, as this species migrates to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009c).

The topographic features located 62 statute miles (100 km) from the project area are designated as EFH under the corals and coral reefs management plan (GMFMC, 2005). An accidental spill would be unlikely to affect these features, since an oil spill plume or surface slick would be unlikely to reach them due to their shallower depth relative to the project area.

C.6 Archaeological Resources

C.6.1 Shipwreck Sites

The wellsite clearance letter did not identify any archaeologically significant artifacts or shipwrecks within 610 m (2,000 ft) of the proposed wellsite (bp, 2023). bp and its contractors will abide by the applicable requirements of NTL 2005-G07 and 30 CFR § 550.194I, which stipulate that work be stopped at the project site if any previously undetected archaeological resource is discovered after work has begun until appropriate surveys and evaluations have been completed.

Because there are no shipwreck sites within 610 m (2,000 ft) of the proposed wellsite, there are no routine IPFs that are likely to affect shipwrecks. The only IPF of relevance to shipwrecks is a large oil spill as listed in **Table 2** are discussed below. A small fuel spill would not affect shipwrecks because the fuel would float and dissipate on the sea surface.

Impacts of a Large Oil Spill

The 2017-2022 EIS (BOEM, 2017) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300-meter (984-feet) radius. Because there are no historic shipwrecks within a 300-meter radius of the proposed wellsite, 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 drilling or other project operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor, Leasing and Environment, within 48 hours of its discovery. Following shipwreck discovery, all operations within 305 m (1,000 ft) of the site would cease until the Regional Supervisor provides instructions on steps to take to protect the site and assess the potential historic significance.

Beyond this 300-meter (984-feet) 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, 2017), 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-meter (984-feet) radius estimated by BOEM (2012a), depending on its extent, trajectory, and persistence.

A spill entering shallow coastal waters could conceivably contaminate an undiscovered or known coastal shipwreck site. 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 a water depth at the location of the proposed wellsite of approximately 2,081 m (6,828 ft), the proposed wellsite is well beyond the 60-meter (197-feet) depth contour used by BOEM as the seaward extent for potential prehistoric archaeological sites in the Gulf of Mexico. Because prehistoric archaeological sites are not known from 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 known from 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-meter (984-feet) 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, 2017). The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Texas and Louisiana could be contacted within 30 days (1% to 3% conditional probability).

If a spill did reach a prehistoric site along these shorelines, it could coat fragile artifacts or site features and compromise the potential for radiocarbon dating of organic materials (other dating methods are available, and it is possible to decontaminate an oiled sample for radiocarbon dating). Coastal prehistoric sites could also be damaged by spill cleanup operations (e.g., by destroying fragile artifacts and disturbing the provenance of artifacts and site features).

C.7 Coastal Habitats and Protected Areas

Coastal habitats in the northeastern Gulf of Mexico that may be affected by oil and gas activities are described by BOEM (2017) and by Mendelssohn et al (2017). 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 from support bases at Port Fourchon and Houma, Louisiana that are not in wildlife refuges or wilderness areas. Potential impacts of support vessel traffic are addressed briefly below.

The only other IPF of relevance for coastal habitats and protected areas is an accidental large oil spill. A small fuel spill in the project area would not affect coastal habitats, as the project area is 121 statute miles (195 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, 2017).

Impacts of a Large Oil Spill

Potential spill impacts on coastal habitats are discussed by BOEM (2017; 2023a,b). 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 in Texas and Louisiana could be contacted within 30 days of a spill (1% to 3% conditional probability).

NWRs and other protected areas along the coast are discussed in BOEM (2017) 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 8**. 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 of the spill (BOEM, 2017).

Table 8. 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 46 based on the 30-day OSRA model.

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Matagorda, Texas	Big Boggy National Wildlife Refuge
	Matagorda Bay Nature Park
	San Bernard National Wildlife Refuge
	West Moring Dock Park
Brazoria, Texas	Brazoria National Wildlife Refuge
	Christmas Bay Coastal Preserve
	Justin Hurst Wildlife Management Area
	San Bernard National Wildlife Refuge
Galveston, Texas	Anahuac National Wildlife Refuge
	Bolivar Flats Shorebird Sanctuary
	Fort Travis Seashore Park
	Galveston Island State Park
	Horseshoe Marsh Bird Sanctuary
	Mundy Marsh Bird Sanctuary
	R.A. Apffel Park
	Seawolf Park
Jefferson, Texas	McFaddin National Wildlife Refuge
	Sea Rim State Park
	Texas Point National Wildlife Refuge
Cameron, Louisiana	Peveto Woods Sanctuary
	Rockefeller State Wildlife Refuge and Game Preserve
	Sabine National Wildlife Refuge
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 WMA (Includes Picciola Tract)
Plaquemines, Louisiana	Breton National Wildlife Refuge
	Delta National Wildlife Refuge
	Pass a Loutre Wildlife Management Area

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. 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 exposed to oil that persists in wetlands could take years to recover (BOEM, 2017). Vegetation coated with oil experiences the highest mortality rates due to decreased photosynthesis (BOEM, 2012a). A 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). Entrained oil within the sediments of a submerged vegetation area may pose the risk of periodic re-releases of oil in the area, causing potential secondary impacts to the localized area (BOEM, 2023b). In addition to the direct impacts of oil, cleanup activities in marshes may accelerate rates of erosion and retard recovery rates (BOEM, 2023a). Impacts associated with an extensive oiling of coastal wetland habitat from a large oil spill are expected to be significant.

C.8 Socioeconomic and Other Resources

C.8.1 Recreational and Commercial Fishing

Potential impacts to recreational and commercial fishing were assessed by BOEM (2017). The main commercial fishing activity in deep waters of the northern Gulf of Mexico is pelagic longlining for tunas, swordfishes, and other billfishes (Continental Shelf Associates, 2002; Beerkircher et al., 2009). Pelagic longlining has occurred historically in the project area, primarily during spring and summer seasons. In August 2000, the federal government closed two areas, outside the project area, in the northeastern Gulf of Mexico to longline fishing (65 FR 47214).

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 fishing 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 predominantly 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 fishing are drilling rig and installation vessel presence which may present an entanglement risk for pelagic longlining. Two types of potential accidents (a small fuel spill and a large oil spill) are the other IPFs of relevance. These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Drilling Rig and Installation Vessel Presence, Marine Sound, and Lights

There is a slight possibility of pelagic longlines drifting into and becoming entangled in the drilling rig or 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 Mexico (Continental Shelf Associates, 2002) and 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 rig-related factors such as marine sound and lights are not relevant IPFs to commercial or recreational fishing.

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 would be brief and opportunity for impacts to fishing activities would be minimal.

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 (2017; 2023a,b). 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 Mexico could be interrupted in the event of a large oil spill. A spill may or may not result in fishery closures, depending on the duration of the spill, the oceanographic and meteorological conditions at the time of the spill, and the effectiveness of spill response measures. The *Deepwater Horizon* incident provides information about the maximum potential extent of fishery closures in the event of a large oil spill in the Gulf of Mexico (NMFS, 2010a). At its peak on 12 July 2010, closures encompassed 217,821 km^2 (84,101 mi^2), or 34.8% of the U.S. Gulf of Mexico EEZ.

According to BOEM (2012a; 2017), 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 fishers 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. 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 121 statute miles (195 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 are addressed below.

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.

Krishnamurthy et al. (2019) identified that exposure to both crude oil and oil dispersant among USCG spill responders during the *Deepwater Horizon* incident was more strongly associated with the suite of acute neurological symptoms that were evaluated than was exposure to oil alone. Those acute neurological symptoms noted in 1% to 3% of responders surveyed included headaches, lightheadedness/dizziness, difficulty concentrating, numbness/tingling sensation, blurred/double vision, and memory loss/confusion. Krishnamurthy et al. (2019) did conduct sensitivity analyses to exclude responders in the highest environmental heat categories and responders with relevant pre-existing conditions due to the symptoms being similar to heat stress.

McGowan et al. (2017) found approximately 1% of responders surveyed were still experiencing symptoms of coughing, wheezing, tightness in chest, shortness of breath, burning in nose, throat, and lungs, burning eyes, itching eyes, and skin irritation within 30 days of the 2011 to 2013 study (1 to 3 years after the oil spill cleanup response).

C.8.3 Employment and Infrastructure

There are no IPFs associated with routine operations that are expected to affect employment and infrastructure. The project involves drilling with support from existing shorebase facilities in Louisiana. No new or expanded facilities will be constructed, and no new employees are expected to move permanently into the area. The project will have a negligible impact on socioeconomic conditions such as local employment, existing offshore and coastal infrastructure (including major sources of supplies, services, energy, and water), and minority and lower income groups. 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 are addressed below.

Impacts of a Large Oil Spill

Potential socioeconomic impacts of an oil spill are discussed by BOEM (2017). For this DOCD, there are no unique site-specific issues with respect to employment and coastal infrastructure. A large spill could cause economic impacts in several ways: it could result in extensive fishery closures that put fishermen out of work; it could result in temporary employment as part of the response effort (including the establishment of spill response staging areas); it could result in adverse publicity that affects employment in coastal recreation and tourism industries; and it could result in suspension of OCS drilling activities, including service and support operations that are an important part of local economies.

Non-market effects such as traffic congestion, strains on public services, shortages of commodities or services, and disruptions to the normal patterns of activities or expectations could also occur in the short-term. These negative, short-term social and economic consequences of a spill are expected to be modest in terms of projected cleanup expenditures and the number of people employed in cleanup and remediation activities (BOEM, 2017). Net employment impacts from a spill would not be expected to exceed 1% of baseline employment in any given year (BOEM, 2017).

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 intended to minimize the chance of trash or debris being lost overboard from the drilling rig and subsequently washing up on beaches. A small fuel spill in the project area would be unlikely to affect recreation and tourism because, as explained in **Section A.9.1**, it would not be expected to make landfall or reach coastal waters prior to dispersing naturally.

Impacts of a Large Oil Spill

Potential impacts of an oil spill on recreation and tourism are discussed by BOEM (2017; 2023a,b). 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 in Texas and Louisiana could be contacted within 30 days of a spill (1% to 3% conditional probability).

According to BOEM (2017), 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 (2017; 2023a,b). There are no routine IPFs that potentially may affect land use. The project will use existing onshore support facilities in Louisiana where land use 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, 2014a).

An accidental oil spill is not likely to significantly affect land use and coastal infrastructure in the region, in part because an offshore spill would have a small probability of contacting onshore resources. BOEM (2016b) states that landfill capacity would probably not be an issue at any phase of an oil spill event or the long-term recovery. In the case of the *Deepwater Horizon* incident and response, the USEPA reported that existing landfills receiving oil spill waste had plenty of capacity to handle waste volumes; the wastes that were disposed of in landfills represented less than 7% of the total daily waste normally accepted at these landfills (USEPA, 2016).

C.8.6 Other Marine Uses

The project area is not located within any USCG-designated fairway, shipping lane, or Military Warning Area. bp intends to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft. An autonomous underwater vehicle survey identified 18 sonar contacts within 610 m (2,000 ft) of the proposed wellsite. An ROV pre-spud survey is recommended to ensure no man-made hazards exist at the drillsite (bp, 2023).

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 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

A large accidental spill would be unlikely to significantly affect shipping or other marine uses. The project area is not located within any USCG-designated fairway, shipping lane, or Military Warning Area. In the event of a large spill requiring numerous response vessels, coordination would be required to manage the vessel traffic for safe operations. bp and its contractor intend to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

C.9 Cumulative Impacts

Prior Studies. BOEM prepared a multi-lease sale EIS in which it analyzed the environmental impact of activities that might occur in the multi-lease sale area. The level and types of activities planned in bp's DOCD are within the range of activities described and evaluated by BOEM in the 2024 to 2029 Programmatic Environmental Impact Statement for the OCS Oil and Gas Leasing Program (BOEM, 2023a), and the Final Programmatic EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2017-2022 (BOEM, 2017). Past, present, and reasonably foreseeable activities were identified in 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; 2014a; 2015; 2016b; 2017; 2023a,b).

Description of Activities Reasonably Expected to Occur in the Vicinity of Project Area. Other exploration and development activities may occur in the vicinity of the project area but bp does not anticipate other projects beyond the types analyzed in the lease sale and Supplemental EISs (BOEM, 2012a; 2013; 2014a; 2015; 2016b; 2017; 2023a,b).

Cumulative Impacts of Planned Actions. The BOEM (2017) Final EIS 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 EIS considered exploration, delineation, and development wells; platform installation; service vessel trips; and oil spills. The EIS examined the potential cumulative effects on each specific resource for the entire Gulf of Mexico.

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

D. Environmental Hazards

D.1 Geologic Hazards

The wellsite clearance report did not identify geologic hazards at the location of the proposed activities (bp, 2023). 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 drilling rig selected for this project. High winds and limited visibility during a severe storm could disrupt support activities (vessel and helicopter traffic) and make it necessary to implement bp contingency plans to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes. From 1992 to 2022, 48 tropical storms and/or hurricanes have shut down oil and gas activities in the Gulf of Mexico (BSEE, 2023). Damage was minimal from the storms in 2017 to 2023, and only Hurricane Ida in 2021 caused an accidental release from a ruptured pipeline and wellhead off the Louisiana coastline (BOEM, 2023b).

In the event of severe weather, guidance as outlined in bp's and/or bp's drilling contractor's site-specific Environmental Emergency Plan, its site-specific hurricane preparation checklist, and the Gulf of Mexico Region Severe Weather Contingency Plan would be adhered to.

D.3 Currents and Waves

Meteorology and physical oceanography conditions such as sea states, wind speed, and ocean currents will be continuously monitored. Under most circumstances, physical oceanographic conditions are not expected to have any effect on the proposed activities. Strong currents (e.g., caused by Loop Current eddies and intrusions) and large waves were considered in the design criteria for the drilling rig selected for this project. High waves during a severe storm could disrupt support activities (i.e., vessel and helicopter traffic), and risks to the drilling program brought on by such conditions would be closely monitored and managed by the team managing the project. In some cases, it may be necessary to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes.

E. Alternatives

No formal alternatives were evaluated in the EIA for the proposed project. However, various technical and operational options, including the location of the wellsite and the selection of a potential drilling unit, were considered by bp. The activity being proposed is the result of a rigorous screening and right-scoping process. It was selected as the best design candidate to reduce risk and optimize deliverability, chosen from numerous options with varying well locations, trajectories, construction designs, and drilling strategies, amongst other variables.

F. Mitigation Measures

The proposed program includes numerous processes and actions that are intended to mitigate potential impact to the environment. The project is expected to comply with applicable federal, state, and local requirements as well as permit conditions of approval concerning protected species, air pollutant emissions, discharges to water, and waste management.

In addition, bp and its drilling contractor intend to implement the following specific measures to prevent marine pollution:

- Proper job planning is an important overall mitigation measure. The fundamental concept and discussion in the pre-tour and pre-job safety meetings is the prevention of harm to people and 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 requirements, the skills and knowledge of personnel are assessed prior to working offshore for bp.
- Equipment transferred to and from the drilling rig will be inspected to ensure pollution pans have been cleaned and to confirm that plugs have been installed prior to leaving the dock and prior to loading on the boat.
- Preventive maintenance of rig and 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 Mexico Waste Management procedures and/or the drilling contractor’s established waste management procedures. Wastes are expected to be categorized, packaged, labeled, stored, manifested, and shipped to an appropriately permitted disposal site.
- Municipal trash containers will be kept covered. Where applicable, trash destined for recycling will be compacted.
- Chemical drums and totes will be stored on containment skids in designated areas of the rig.
- Hazardous waste shall be placed in approved containers on the rig.
- Rig fuel vents will have containment boxes.
- All municipal, non-hazardous, hazardous, and universal wastes are placed in an applicable recycling bag or box, Omega bin, Department of Transportation Drum, cutting box, universal box, waste bin, E&P Drum, tote tank or NORM container, labelled, 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 and liquid mud hoses to ensure isolation of any hose failures.
- On-site spill kits are inspected regularly and re-stocked as needed.
- Drills are conducted regularly, often engaging the IMT onshore to measure the effectiveness and quality of processes deployed to address oil spill scenarios.
- Fuel hoses and SBM hoses will be changed based on the maintenance schedule of the drilling rig and in accordance with USCG regulation annual inspection.

G. Consultation

No persons or agencies other than those listed as Preparers (**Section H**) were consulted during the preparation of the EIA.

H. Preparers

The EIA was prepared by CSA Ocean Sciences Inc. Contributors included:

- John M. Tiggelaar II (Project Scientist);
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Appendix J: New and Unusual Technologies

See Section 2.5 - TCP Jumper New Technology - NT DWOP

MPD for GoM Development Wells

Context

Managed Pressure Drilling (MPD) is defined by the International Association of Drilling Contractors (IADC) as "An adaptive drilling process used to precisely control the annular pressure profile throughout the wellbore." The ability to control the annular pressure profile facilitates remaining within the downhole pressure limits imposed by the well's Pore Pressure Fracture Gradient (PPFG) and including additional factors like wellbore stability and trip margin. A study conducted by the Drilling Engineers Association on behalf of the U.S. Department of Interior Minerals Management Service concluded "MPD is as safe as or safer than conventional offshore drilling" (Malloy, 2008).

Background

BP has been using Surface Back Pressure (SBP) MPD to successfully deliver complex High Pressure High Temperature (HPHT) exploration wells in Egypt since 2007. This MPD method has many advantages for this environment, where geological uncertainty and associated challenges often lead to high Non-Productive Time (NPT) or inability to deliver exploration objectives. BP has also used this method to successfully deliver a shallow water deep gas exploration well in the GoM in 2009. The advantages of this method in exploration wells have long been established.

It is worth mentioning that the SBP method is not limited to exploration and appraisal wells, and it has been used successfully within BP to drill development wells where the high mud weight required for wellbore stability leads to a narrow drilling window and an increased risk of losses in depleted sands.

SBP MPD Theory

SBP MPD, often referred to within the industry as Constant Bottom Hole Pressure (CBHP), uses surface pressure to supplement a lighter than conventional mud weight to maintain an overbalanced condition. This technique enables maintaining a near constant pressure throughout the open hole well bore when both dynamic and static. This prevents the pressure cycling experienced by the open hole well bore which can cause well bore fatigue and lead to underbalanced conditions (i.e. kicks taken at pumps off events). The ability to apply SBP reduces the well control risk of allowing an influx during pumps off events and on trips. The system also provides an early kick and loss detection capability through the use of pressure monitoring and high accuracy flow rate monitors such as a Coriolis meter.

Benefits of SBP MPD for Development wells in GoM

GoM deepwater development wells, particularly sub-salt, face many challenges such as:

1. PPFG uncertainty, particularly with poor seismic imaging sub-salt.
2. Tight operating window between Pore Pressure and Fracture Gradient, which may potentially increase the risk of losses or well control issues.

3. Equivalent Circulating Density (ECD) management.
4. Risk and time associated with riser gas events.
5. Wellbore ballooning.
6. Challenges associated with salt exit uncertainty
7. Difficulty tripping out or pumping of hole due to narrow window and swabbing / losses.

SBP MPD allows managing and mitigating these challenges through the ability to control bottomhole pressure and maintain it near constant. Benefits of SBP MPD for development wells may include:

1. Early Kick/Loss detection.
2. Fast and Precise control of BHP.
3. Constant BHP reduces or eliminates ballooning. Unmanageable wellbore ballooning is a common cause for high NPT and failure to reach Total Depth (TD) objectives in development and HPHT environments.
4. Allows identification of operating window boundaries. A dynamic Formation Integrity Test (FIT) can be quickly carried out to test wellbore integrity prior to making any changes to mud weight.
5. Allows tripping out with surface pressure to mitigate swabbing effects, instead of pumping out or raising Mud Weight (MW).
6. The SBP system provides a safer and more efficient well and riser degassing method for floating operations.

BP use of SBP MPD for Development wells in GoM

The SBP MPD method is the MPD method which is most suitable to address the drilling challenges encountered in GoM development as it is more suited to deal with well challenges such as geological uncertainty, tight PPFG window, well bore ballooning and well bore stability with rapid response capabilities to react to changing down hole conditions by adjusting the BHP precisely and quickly. In addition, the SBP MPD system provides additional techniques to examine the well bore boundaries of the PPFG by performing well bore bleed downs and dynamic FITs.

SBP MPD equipment for Development wells in GoM

The SBP MPD equipment package will be detailed in a technology permit submitted and approval sought from BSEE for each each rig equipped with MPD.

Appendix K: Recovery Fee Receipt

Pay.gov

Receipt

Tracking Information

Pay.gov Tracking ID: 27COOVF3

Agency Tracking ID: 76664506204

Form Name: BOEM Development Operations Coordination Document or DPP

Application Name: BOEM Development/DOCD Plan - BD

Payment Information

Payment Type: Debit or credit card

Payment Amount: $5,017.00

Transaction Date: 03/15/2024 04:11:20 PM EDT

Payment Date: 03/15/2024

Region: Gulf of Mexico

Contact: Kevin Stanley (713) 865-3786

Company Name/No: BP Exploration & Production Inc. , 02481

Lease Number(s): 15604, 15606, 15607, 15608

Area-Block: Green Canyon GC, 743

Type-Wells: Supplemental Plan, 1

Account Information

Cardholder Name: Kevin Stanley

Card Type: Master Card

Card Number: ************2251