UNITED STATES GOVERNMENT February 7, 2023
MEMORANDUM

To: Public Information
From: Plan Coordinator, OLP, Plans Section (GM 235D)

Subject: Public Information copy of plan
- Control # - S-8133
- Type - Supplemental Development Coordinations Document
- Lease(s) - OCS-G 33859 Block - 868 Green Canyon Area
- Operator - BP Exploration & Production Inc.
- Description - Subsea Wells DC6-C, DC6-D and DC6-E.
- Rig Type - Drillship or DP Semisubmersible

Attached is a copy of the subject plan.

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

Nicole Martinez
Plan Coordinator

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**Security Descriptor:**
Project Internal

# P&O Projects

## Argos Southwest Extension (ASWX)
## Supplemental Development Operations Coordination Document

Green Canyon Blocks
825, 868
Leases
OCS - G09981, G33859

**PUBLIC INFORMATION**

| Rev | Reason for Issue | Author | Date | Checked | Date | Approved | Date |
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## Amendment Record Revision History

| Amendment Date | Revision Number | Amender Initials | Amendment |
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## OMS References

| OMS Section Ref | OMS Section Title | Relevant Section of this Document |
|---|---|---|
| 7.1 | Regulatory Compliance | All |
| | | |

## MPcp References

| CVP stage | MPcp functional performance element | Relevant section of this document |
|---|---|---|
| | | |

## Related Documents

| Document Number | Document Name | Location |
|---|---|---|
| GM004-RG-PRM-000-00001 | MD2 Project Initial DOCD | Project Library |
| GM004-RG-PRM-000-00022 | MD2 DC6-Project Update DOCD | Project Library |

## Stakeholders

Stakeholders will be agreed with the Approver during small group review.

| Name | Date Reviewed |
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## Holds

| Holds Section Number | Short Description of Hold |
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# 1 Plan Contents

## 1.1 Description of Activities

BP Exploration & Production Inc. (BP) is submitting a Supplemental Development Operations Coordination Document (SDOCD) for the Argos Southwest Extension (ASWX) as part of the overall Mad Dog 2 (MD2) project with plans to produce back to ARGOS semisubmersible Floating Production Unit (FPU). The ARGOS FPU is planned for production handling for up to 140 MBOPD from subsea tieback wells, secondary recovery water injection, and accommodations for 120 POB with 12 chain-polyester-chain mooring lines (no drilling rig). The ARGOS FPU is located in the GoM Green Canyon Area Block 780 in approximately 4,450' water depth, 166 miles south of Houma and 129 miles to the nearest shore point. First oil occurred in April 2023.

This ASWX SDOCD is being submitted to add three (3) wells in Green Canyon 868 at previously approved Drill Center 6 (DC6) in addition to the thirty-five (35) total wells approved in the project Initial DOCDs N-9830 and N-10048. A Dynamically Positioned (DP) drillship or a DP semisubmersible will drill the wells and all installations will be conducted by DP vessels. No vessels requiring anchors will be utilized for this project.

The new and revised information in this Supplemental DOCD includes:

- Drill Center 6 (DC6) in GC 868 was approved for two (2) subsea producers and this project update SDOCD is to include one (1) additional subsea producer plus two (2) additional contingency well locations. At DC6, this project update SDOCD is to also include:
  - Three (3) well jumpers
  - One (1) manifold with pigging loop and suction pile
  - Two (2) flowline jumpers
  - Two (2) PLETs and holdback system
- Drill Center 2 (DC2) in GC 825 was approved for two (2) flowlines and one (1) umbilical connecting to Drill Center 6. At DC2, this project update SDOCD is to also include:
  - One (1) PLEM and suction pile
  - Four (4) flowline jumpers
  - Two (2) PLETs and holdback system

## 1.2 History of Unit Leases

Green Canyon Area Block 826 Unit, Agreement 754398016, first became effective April 27, 1998 consisting of the S2 of Green Canyon (GC) Area Block 782 OCS-G 15610, all of GC 825 OCS-G 09981, and all of GC 826 OCS-G 09982. Effective January 13, 2005, the initial GC 826 Unit Participating Area was approved by BSEE covering portions of GC 826. Effective January 13, 2014, the Green Canyon 826 Unit contracted to consist of portions of GC 782 and GC 826. Effective January 1, 2016 the Green Canyon 826 Unit was expanded and currently consists of portions of GC 781 OCS-G 15609, GC 782, and GC 826.

The Plans history is as follows:

- An Initial Plan of Exploration (POE, Control No. N-6130) for well locations A, B, and C at GC 826 (pre-unitization) was approved April 22, 1998. The B location was drilled as GC 826 Well #1.
- This POE (Control No. R-3333) was revised (approved September 17, 1999) to change GC 826 A location to GC 782 A. Location A was then drilled as GC 782 Well #1.


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- A new POE (Control No. 6717) was approved April 18, 2000 for GC 783 A, B and GC 782 C.
    - This POE was revised twice. The first revision was to use an anchored rig for GC 783 A (approved July 25, 2000). This location was drilled as GC 783 Well #1.
    - The second revision (approved August 2, 2000) was to move the location of GC 782 C inside the unit boundaries, and it was subsequently drilled as GC 782 Well #2 (geotechnical well)
    - The POE was further supplemented and revised (approved June 21, 2001) for three additional well locations D,E,F. The F location was drilled as GC 782 Well #4
- BP received approval of Initial Development Operations Coordination Document (DOCD) N-7415 on December 3, 2002 to drill and complete 14 wells designated as Well Locations G through T, including re-entering and completing the existing wells GC 782 #1 and GC 782 #4 ST1, installation of a truss spar, and commencement of production. The DOCD provided for 3 wells to be drilled and 2 re-entered from a Mobile Offshore Drilling Units (MODU) and 9 wells to be drilled from a platform drilling rig.
    - Installation of the Mad Dog Spar in Green Canyon Area Block 782 was completed on July 30, 2004. Production commenced on January 13, 2005.
    - Seven well locations from DOCD N-7415 have been drilled, completed and produced. Two well locations from this DOCD have been spud but not drilled to total depth. Revised DOCD R-5519 was approved on January 7, 2013 to provide NTL N06 data for the remaining wells from DOCD N-7415.
- BP received approval for Initial EP N-8956 on April 27, 2007 which provided a bottom hole location in GC 781 for a test well for coring operations.
- BP submitted Initial DOCD N-9176 on April 3, 2008 for Well Location A (SHL in GC 782, BHL in GC 825) and Well Location B (SHL in GC 782, BHL in 781). Note: Prior to approval, DOCD N-9176 was modified from an Initial DOCD to a Supplemental DOCD and the plan Control No. N-9716 was changed to plan Control No. S-7233 by BSEE. DOCD S-7233 was approved on June 13, 2008.
- One well from SDOCD S-7233, was spud but, not drilled to total depth. Revised DOCD R-5519, approved on January 7, 2013, was submitted to provide NTL N06 data for both well locations approved in S-7233.
- BP received approval of Initial EP N-9475 on February 19, 2010 to drill and permanently abandon 26 soil bore wells in GC 825, 826, 869, and 870 utilizing a dynamically positioned geotechnical vessel.
- BP received approval for Revised DOCD, Control No. R-5632, on November 14, 2012, for six manifold foundation suction piles in Green Canyon Block 825.
- BP received approval November 28, 2012 for Supplemental EP Control Number S-07582 for 23 wells to be drilled from Drill Centers 1, 2 and 4 in Green Canyon Block 825.
- BP received approval January 7, 2013 for the Revised DOCD R-5519 to meet the requirements of Notice to Lessees and Operators (NTL) 2010-N06 and BOEMRE guidance document issued December 13, 2010 “Approval Requirements for Activities That Involve the Use of a Subsea Blowout Preventer (BOP) or a surface BOP On a Floating Facility” for ten well locations previously approved in Initial DOCD Control No. N-7415 and Supplemental DOCD Control No. S-7233.
- The Initial DOCD N-9830 approved March 5, 2015 included the Mad Dog Phase 2 (MD2) installation of a semisubmersible Floating Production Unit (FPU to be named later, now named ARGOS) and associated anchor system in Green Canyon 780 OCS-G 25200 (now RUE OCS-G 30300). The proposed oil capacity will be up to 140 MBOPD, with produced water 60 MBWPD and up to 210 MBWPD low salinity water for enhanced recovery water flood. The Initial DOCD also included installing flowlines, pipelines, drill centers, manifolds, associated appurtenances, and subsea equipment, as well as drill, complete and produce or inject into twenty-nine (29) wells, (seventeen (17) wet tree producers and twelve (12) wet tree enhanced recovery waterflood injector wells from five (5) Drill Centers (DC) located in Green Canyon Blocks 825 (GC 825) and 870 (GC 870) Gulf of Mexico (GoM), OCS-G 09981 and OCS-G 28101 (now OCS-G 36056). The well bottom hole locations


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located in Green Canyon 781, 824, 825, 826, 869 and 870, Gulf of Mexico (GoM), OCS-G 15609, OCS-G 33855, OCS-G 09981, OCS-G 09982, OCS-G 28100 and OCS-G 28101 (now OCS-G 36056).

- March 5, 2015 the BP Mad Dog 2 project received Right-of-Use and Easement (RUE) approval for the unleased GC 780 OCS-G 25200 (now RUE OCS-G 30300), to cover the installation of a semi-submersible Floating Production Unit (FPU Platform "A" to be named later, now named ARGOS) and for portions of the platform anchorage system. The remaining anchorage system will be installed in GC Blocks 781 and 824 owned by BP.
- On June 1, 2016, the lease OCS-G 28101 GC 870 was deemed terminated on its own terms. Effective July 1, 2017 BP acquired the OCS-G 36056 GC 870 lease, during the 2017 lease sale. The Initial DOCD N-9830 approved March 5, 2015 included water flood injection wells, installing Drill Center 5, manifolds, associated appurtenances, and subsea equipment required for the wet tree enhanced recovery waterflood wells on GC 870.
- Lease OCS-G 33855 GC 824 had an expiration date of August 31, 2018. BP spudded GC 824 Well #1, an exploration well, pursuant to the terms of this lease to perpetuate it past the initial seven (7) year primary term. Prior to the of lease expiration of GC 824 on August 31, 2021, BP will file a Right-of-Use and Easement request for the ARGOS semisubmersible FPU suction pile (anchor) locations and for the two (2) water injectors. BP will also pursue expanding the Mad Dog Unit (Participating Area) into portions of GC 824 and 825 prior to MD2 project ARGOS first oil.
- The Mad Dog Exploration Plan N10028 for GC 870 OCS-G 36056 and GC 826 OSC-G 09982 for three water flood injector wells was approved November 9, 2018.
- The Mad Dog Argos Initial Development Operations Coordination Document N10048 for GC 825 OCS-G 09981, GC 826 OCS-G 09982, GC 869 OCS-G 28100 and GC 868 OCS-G 33859 for two wells at new Drill Center 6 and four wells at previously approved Drill Center 1, 2 and 4 was approved July 19, 2019.

## 1.3 Location

Well location Plats at a scale of 1-in = 2,000-feet on an 8.5-in X 11-in sheets of paper that depicts the surface locations and water depths of the proposed wells are included in **Appendix B**. The Vicinity Chart and Bathymetry plats are also included in **Appendix B**.

## 1.4 Safety and Pollution Prevention Measures

Safety and pollution prevention features utilized during drilling operations will include the use of appropriately designed casing and cement programs; appropriate subsea 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, Sub Parts C, D, E, F and O, 30 CFR Part 550, Sub Parts B and C, and as further described by Notices to Lessees (NTLs). Appropriate fire drills and abandon ship drills will be conducted, and navigational aids, lifesaving equipment, and all other shipboard safety equipment will be installed and maintained as mandated by the U.S. Coast Guard regulations contained in 33 CFR Part 144.

## 1.5 Storage Tanks and Production Vessels

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


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### 1.5.1 Storage Tanks – DP Semisubmersible

| Type of Storage Tank | Type of Facility | Tank Capacity (bbls) | No. of Tanks | Total Capacity (bbls) | Fluid Gravity (API) |
|---|---|---|---|---|---|
| Fuel Oil | DP Semisubmersible | 3,812 | 14 | 53,368 | 31.14 |
| Fuel oil | DP Semisubmersible | 4,448 | 4 | 17,792 | 31.14 |
| Lube oil | DP Semisubmersible | 41 | 2 | 82 | 34.971 |
| Lube oil | DP Semisubmersible | 12 | 2 | 24 | 34.971 |
| Base oil | DP Semisubmersible | 4,718 | 1 | 4,718 | 20.651 |

### 1.5.2 Storage Tanks Volumes Drill Ship

| Type of Storage Tank | Type of Facility | Tank Capacity (bbls) | Number of Tanks | Total Capacity (bbls) | Fluid Gravity (API) |
|---|---|---|---|---|---|
| Fuel Oil | Drillship | | | 104,190 | 34.9 |
| 1C | | 12,505 | 1 | | |
| 1P | | 12,095 | 1 | | |
| 1S | | 11,327 | 1 | | |
| 2C | | 12,505 | 1 | | |
| 2P, 2S | | 12,095 | 2 | | |
| 3P, 3S | | 12,988 | 2 | | |
| DO Sett P, S | | 1,988 | 2 | | |
| DO Service Tank P, S | | 808 | 2 | | |
| Lube Oil | Drillship | 331 | 2 | 663 | 29.29 |
| Base Oil | Drillship | 2,958 | 1 | 2,958 | 34.9 |
| Production | Drillship | N/A | N/A | N/A | N/A |

### 1.5.3 Storage Tanks Support Vessels

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

## 1.6 Additional Measures

In addition to the safety, pollution prevention and early spill detection measures that may be required by applicable regulations, 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. Within OMS, BP has also implemented a Safety Environmental Management System (SEMS) in accordance with 30 CFR 250 Subpart S, which provides a systematic way to identify risks, potential impacts, and compliance requirements that need to be managed.

The platform structure has been designed, fabricated and installed according to 30 CFR Part 250 Subpart I, and subsea pipeline architecture according to requirements in Subpart J. Pollution prevention systems include curbs,


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gutters, drip pans, and drains in deck areas to collect contaminants and oil drainage that is then piped to sump systems to reduce the risk of discharge of oil into offshore waters. The platform is protected by an automated shutdown system including SCSSV, and USV integrated with pipeline SDVs. The system is designed to shut in a well following a system shutdown signal. The wells and pipelines will be monitored by pressure sensors and automatic shut in systems. Wells will be monitored for casing pressure according to BSEE guidelines. Production Safety Systems are designed and installed according to 30 CFR Part 250 Subpart H, with further clarifications by Notices to Lessees. The systems will include the safety and environmental analysis procedures afforded by SAFDs and SAFE Charts developed according to requirements of API RP 14 C, and other API Recommended Practices. Pollution prevention systems are developed to adhere to EPA NPDES permit discharge requirements and 30 CFR Part 250 Subpart C. Appropriate fire and abandon drills will be conducted, and navigational aids, lifesaving equipment, and other safety equipment are installed and maintained as mandated by the U.S. Coast Guard regulations contained in 33 CFR Part 144.

# 2 General Information

## 2.1 Applications and Permits

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

| Application / Permit | Issuing Agency | Status |
|---|---|---|
| General NPDES Permit | EPA | Existing |
| Applications for Permit to Drill (APD) | BSEE | Pending Submittals |
| S-Deepwater Operations Plan | BSEE | Pending Submittal |
| Revised Conservation Information Document | BOEM | Revision Pending Submittal |
| Lease Term Pipeline Applications | BSEE | Pending Submittals |
| Measurement Surface Commingle Application | BSEE | Pending Submittal |
| Downhole Commingling Applications | BSEE | Pending Submittal |
| Applications for Permit to Modify (APM) | BSEE | Pending Submittal |
| Right-of-Use and Easement Applications | BOEM | Pending Submittal |

## 2.2 Drilling Fluids

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


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**Drilling Fluids per Well (145 Days)**

| Type of Drilling Fluid | Estimated Volume of Drilling Fluid to be Used Per Well |
|---|---|
| Water based (seawater, freshwater, barite) | 25,000 bbls |
| Oil based (diesel, mineral oil) | NA |
| Synthetic based (internal olefin, ester) | 25,000 bbls |

## 2.3 Anticipated Production Table

| Type | Average Production Rate | Peak Production Rate | Life Of Reservoir |
|---|---|---|---|
| PROPRIETARY DATA | | | |


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## 2.4 Oil Characteristics

| Characteristic | Value | Analytical Methodologies |
|---|---|---|
| PROPRIETARY DATA | | |

## 2.5 Oil Composition

| Oil from one well - Sample Well |
|---|
| PROPRIETARY DATA |

## 2.6 New or Unusual Technology

In accordance with the definition of "new or unusual technology" set forth in 30 CFR § 550.200, exploration activities in Green Canyon Block 868 will utilize the Managed Pressure Drilling (MPD) technology to mitigate non-productive events associated with pore pressure / fracture gradient (PPFG) uncertainty.

## 2.7 Bonding Information

The bonding requirements for the activities proposed in this DOCD are satisfied by an area-wide bond, furnished and maintained according to 30 CFR Part 556, Subpart I, and NTL No. 2015-N04 "General Financial Assurance" and to the extent under 30 CFR 556.901.

## 2.8 Oil Spill Financial Responsibility (OSFR)

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

## 2.9 Deepwater Well Control Statement

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

## 2.10 Suspensions of Production

BP anticipates all lease blocks will be held by operations then production; therefore, BP does not anticipate filing any additional SOP applications for the project.


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## 2.11 Blowout Scenario

### 2.11.1 Blowout Scenario

Based on analysis, the blowout scenario worst case discharge of the wells proposed in this plan, are not expected to exceed the worst case approved November 28, 2012 in the Supplemental EP Control Number S-07582.

The blowout scenario assumes that the pipe has been tripped out of the hole when a problem with the wellhead connector develops, resulting in the removal of the BOP stack. Due to the loss of riser margin, the well flows unrestricted. Day 1 worst case discharge (WCD) is 135,000 bopd, the calculation support package for this rate was approved as part of the November 28, 2012 in the Supplemental EP Control Number S-07582 for the Drill Center 1 Well A in Green Canyon Block 825. The maximum duration of the blowout is estimated at 103 days (see relief well timing below). The rate profile associated with the well blowout over this 103-day period (also approved November 28, 2012 in the Supplemental EP Control Number S-07582) results in a potential worst case spill volume estimated at 11.51 mmbo.

### 2.11.2 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' approved November 28, 2012 in the Supplemental EP Control Number S-07582. The open hole intervals experienced on each well have multiple formations open simultaneously. The modeling of the failure point of the weakest interval includes many variables, and using no bridging yields a maximum flow potential.

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

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

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

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

The table below lists the Mobile Offshore Drilling Units (MODUs) 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 infrastructure in the vicinity of Green Canyon Block 868.


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| Rig Name | Current Location | Current Operator | Contract Expire Date | Rated WD (feet) | Rated TD (feet) | Rated BOPs (psi) | Moor Type | Relevant Drill Package Limitations |
|---|---|---|---|---|---|---|---|---|
| West Auriga | GOM | BP | 2024 | 10K | 37.5K | 15K | DP | SHDH4 connector |
| Diamond BlackHornet | GOM | BP | 2025 | 12K | 40K | 15K | DP | SHDH4 connector |
| Diamond BlackLion | GOM | BP | 2024 | 12K | 40K | 15K | DP | SHDH4 connector |

The estimated time to drill a relief well is: 10 days to mobilize and spud, 25 days from spud to casing shoe above WCD zone, plus 35 days for ranging, intersection, and kill operation--for a total of 70 days.

### 2.11.5 Measures That Would Enhance the Ability to Prevent a Blowout

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

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

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

1. BP will use and will require its contractors involved in drilling operations to use, subsea blowout preventers (BOPs) equipped with no fewer than two blind shear rams and a casing shear ram on all drilling rigs under contract to BP for deepwater service operating in dynamic position mode. With respect to moored drilling rigs under contract to BP for deepwater drilling service using subsea BOPs, the subsea BOP will be equipped with two shear rams, which will include at least one blind shear ram and either an additional blind shear ram or a casing shear ram.
2. Each time a subsea BOP from a moored or dynamically positioned drilling rig is brought to the surface and testing and maintenance on the BOP are conducted, BP will require that a third party verify that the testing and maintenance of the BOP were performed in accordance with manufacturer recommendations and API RP 53.

### 2.11.6 Measures That Would Reduce the Likelihood of a Blowout

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

1. Minimize any influx events to the wellbore by using the best pore pressure / fracture gradient predictions available, using down-hole tools when appropriate, such as PWD and/or LWD to monitor the wellbore and update pore pressure / fracture gradient predictions;
2. Management of change process is in place for all procedure changes;


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3. A Well Control Response Guide is in place; and
4. With the integration of the Regional Collaboration Center (RCC) (formerly referred to as the 'HMC'), BP has staff monitoring wells 24/7. Having a monitoring center away from the rig in a controlled environment gives BP the opportunity to evaluate data real time and communicate issues to the Wells Superintendent and Wells Engineer, as well as the rig.

### 2.11.7 Measures Which Would Enhance the Ability to Conduct Early Intervention

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

1. Possible relief well locations have been identified and screened for general acceptability. In the event of a blow out or other event necessitating a relief well, data will be collected post-event to ensure that previously-identified relief well locations are still valid, or to assist in determining alternate relief well locations if required;
2. Wellhead equipment and sufficient casing is identified and available for a relief well;
3. A rig(s) is identified and available for a relief well;
4. A Well Control Response Guide is in place; and
5. An Incident Management System (IMS) is in place.
    - The BP IMS is comprised of government-approved plans covering various scenarios; Incident Management Teams are trained annually in the Incident Command System, which is a part of the National Incident Management System; BP has access to response capability through various contractors and technical specialists; and to predesignated facilities, where the teams can provide adequate oversight to the response.

### 2.11.8 Other Measures

All proposed activities and facilities in this DOCD will be covered by the GoM Regional OSRP filed by BP America Inc (Operator No. 21372) under cover letter dated October 7, 2022 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on November 29, 2022.

# 3 Geological and Geophysical Information

## 3.1 Geological Description

A brief geological description of the South-West Extension region is included in **Appendix C** in the "Proprietary Information" copies of this Supplemental DOCD.

## 3.2 Structure Contour Maps

Current structure contour maps are included in **Appendix C** in the "Proprietary Information" copies of this Supplemental DOCD.

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

Migrated and annotated 3-D seismic lines with depth scale within 152 meters (500 feet) of the proposed surface locations are enclosed with the site clearance letters included in **Appendix C** in the "Proprietary Information" copies of this Supplemental DOCD. (Supplemental EP Control Number S-07582 approved November 28, 2012 for 23 wells drilled from Drill Centers 1, 2 and 4 in Green Canyon Block 825. Initial DOCD Control No N-9830 approved March 5, 2015 for 29 wells drilled, completed and produced or injected from DC1, DC2, DC3, DC4 and DC5 surface


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locations in Green Canyon 825 and 870 and the Exploration Plan N-10028 for Green Canyon 870 three enhanced recovery water injection wells approved November 8, 2018.)

## 3.4 Geological Structure Cross-Section Maps

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

## 3.5 Shallow Hazards Report

The following report was submitted with RDOCD R-5519 on March 30, 2012 approved on January 7, 2013:

Geoscience Earth & Marine Services, Inc (GEMS), 2011a,"Mad Dog Area, High-resolution 3D geohazard assessment, Blocks 695, 737-740, 780-784, 824-828, 869-871, Green Canyon Protraction Area, U. S. Gulf of Mexico", GEMS Project No. 0410-1775. Houston, Texas, USA.

The following report was submitted with DOCD R-5632 on June 13, 2012 approved November 14, 2012:

Geoscience Earth & Marine Services, Inc (GEMS), 2011b,"Geologic and Stratigraphic Assessment, Mad Dog Phase 2 AUV Survey Area, Blocks 736-737, 780-782, 824-826, and 868-870, Green Canyon Protraction Area, U. S. Gulf of Mexico", GEMS Project No. 0410-1774. Houston, Texas, USA.

The following report was submitted with the Initial DOCD N-9830 approved March 5, 2015:

Fugro GeoServices, Inc. (FGSI), 2006, "Geohazards Assessment, Puma Appraisal Area, Green Canyon Protraction Area, U.S. Gulf of Mexico", Report No. 2406-2146.

The following report was submitted July 26, 2018 for the Exploration Plan Control No. N-10028:

Gardline Surveys, Inc., 2012, "3D Geohazard Assessment, Gulf of Mexico-Green Canyon, Blocks GC691-695, GC734-740, GC778-784, GC822-829, GC867-873, GC911-917, GC956-957 & GC1000-1001, Mad Dog Phase 2." Gardline, Houston

## 3.6 Shallow Hazards Assessments (Site Clearance Letters)

The shallow hazards assessments (site clearance letters) that evaluate the seafloor and subsurface geologic and manmade features and conditions, prepared in accordance with NTL 2008-G05, for the proposed surface locations for the three (3) DC6 wells: C, D, and E locations along with the site clearance for the mooring pre-lay are included in **Appendix C** of this DOCD.

## 3.7 High Resolution Seismic Lines

Seismic sections through the proposed well locations for the proposed three (3) wells from DC6 are included in **Appendix C** of this DOCD.

# 4 Hydrogen Sulfide ($H_2S$) Information

## 4.1 Hydrogen Sulfide ($H_2S$) Information

Anticipated $H_2S$ concentration is 0 ppm. Mad Dog 2 project had the estimated H2S concentration and area classification in the Initial DOCD Control Number N-9830, approved March 5, 2015 and the as H2S absent.

The following correlative wells in the same Green Canyon area, were drilled into similar geologic horizons without encountering $H_2S$; GC 825-1 (22,890 feet MD), GC 826-4-ST02 (22,280 feet MD), GC 826-1 (19,010 feet MD), GC


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826-5 (22,645 feet MD), and GC 826-5 ST1 (27,143 feet MD). Other wells drilled into similar geologic horizons are GC 738-001-ST00BP00 (23,305 feet MD), GC 783-1(21,810 feet MD), GC 823-2 (23,200 feet MD). BP requests that the area BOEM confirm the "$H_2S$ absent" classification.

## 4.2 $H_2S$ Contingency Plan

Based on previous drilling, no $H_2S$ is known to occur in the project area. It is not expected that H2S will be encountered during the operations proposed in this DOCD. Based on previous BOEM "$H_2S$ absent" classification, it is not anticipated that a contingency plan will be required.

## 4.3 Modeling Report

Based on previous drilling, no $H_2S$ is known to occur in the project area. Therefore, no modeling report is required.

# 5 Mineral Resource Conservation Information

## 5.1 Technology and Reservoir Engineering Practices and Procedures

BP Exploration & Production Inc. pioneered the industry's first Wide Azimuth Towed Streamer (WATS) survey over Mad Dog. The 2011-2012 reprocessing merged all available multi-WATS and NATS datasets to improve seismic imaging of the Mad Dog field. The most recent seismic acquisition, an Ocean Bottom Node Survey (OBN), was shot in 2022 with the final 25Hz EFWI processed volume delivered in July 2023. Mad Dog 2 Project ARGOS FPU started production in April 2023. BP is planning Argos Southwest Extension (ASWX) project as a subsea tieback to the existing DC-2 manifold of the ARGOS FPU. BP will be monitoring and analyzing individual well pressure drawdown and buildup data to get a better understanding of the reservoir. BP will be integrating the latest drilling results, seismic interpretations from reprocessed data sets, and individual well production and pressure data to refine reservoir simulation models to better forecast future field performance.

## 5.2 Technology and Recovery Practices and Procedures

To achieve optimum recovery, BP is planning Argos Southwest Extension (ASWX) project as a subsea tieback to the existing DC-2 manifold of the ARGOS FPU. BP has a plan to ensure the wells can deliver their production potential and are fit to recover the reserves in the long-term, such as: well data acquisition, surveillance, sand management, flow assurance, and well integrity managements. BP will have a plan to manage voidage replacement to minimize pressure depletion and maximize ultimate recovery. Additionally, BP is using the latest technology for completion efficiency to achieve low skin numbers aligned with other ARGOS wells and will be applying the same technology to the ASWX wells. BP is planning to have Down Hole Flow Control (DHFC) in the well being added to this DOCD to manage drawdown and depletion in different sand packages. This Supplemental DOCD is for one well and two re-spuds.

## 5.3 Reservoir Developments

BP is planning to drill an additional four wells to fully develop the Argos Southwest Extension (ASWX) area.


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# 6 Biological and Physical Information

## 6.1 Benthic Communities Report

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

The MD2 project is located in water depths greater than 300-m; therefore, there is the potential for high-density benthic communities to be present. Site Clearance Letters for Drill Centers 1, 2 and 4 were approved November 28, 2012 in EP S-07582. Well locations for Drill Centers 3, 4 and 5 and the facility suction pile locations were cleared in the Initial DOCD N-9830 approved March 5, 2015. Well locations for Drill Center 6 (DC6-A and DC6-B) were cleared in the Initial DOCD N-10048 approved July 19, 2019. Site Clearance Letters in **Appendix C** provide a current review of available data confirming the absence of high-density benthic communities within the prescribed distances from the proposed well locations for Drill Center 6.

## 6.2 Topographic Features Map

All proposed bottom-disturbing activities will occur outside the "3 Mile Zone" of any identified topographic features in NTL No. 2009-G39. Topographic feature map is included in **Appendix C.**

## 6.3 Live Bottom (Pinnacle Trend) Information

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

## 6.4 Live Bottom (Low Relief) Map

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

## 6.5 Biologically Sensitive Underwater Features and Areas

The proposed activities will be conducted in water depths of approximately 4,300 ft to 7,100 ft. Therefore, requirements of NTL 2009-G39 for biologically sensitive underwater features and areas such as Topographic Features, Live Bottom (low-relief), Live Bottom (Pinnacle Trend) features, and other potentially sensitive biological features when conducting OCS operations in water depths less than 300-m (984-ft) in the Gulf of Mexico do not apply to this plan.

All proposed bottom-disturbing activities in this DOCD will occur in water depths of approximately 4,300 ft to 7,100 ft, well outside of the avoidance zones around Topographic Features, and Live Bottom (low Relief), and Live Bottom (Pinnacle Trend) Stipulation Blocks described in NTL 2009-G39 and shown on BOEMRE April 2011 Map: "Biologically Sensitive Areas (< 300-m)".

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

MD2 blocks fall within Grid 13. It has been determined by the BOEM that sufficient remotely operated vehicle (ROV) information has been gathered in Grid 13; therefore, a requirement for a new ROV monitoring survey is not anticipated.


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

Endangered or Threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in the table below. The table also indicates the location of critical habitat (if designated in the Gulf of Mexico). Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. The 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.


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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 |
| 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 | None |
| 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 |


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| 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 |
| 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 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 Federal Register [*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*), 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*), and four subspecies of beach mouse. Critical habitat has been designated for all of these species (except the Florida salt marsh vole) 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*), and giant manta ray (*Mobula birostris*) 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, or the sperm whale.


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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. (2022) suggests the range may be broader than previously thought (see **Section C.3.2**). The giant manta ray could occur in the project area but is most commonly observed in the Gulf of 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. 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 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.

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. Additional information can be found in BP's Environmental Impact Analysis attached as **Appendix I**.

## 6.8 Archaeological Report

MD2 Green Canyon area is not located within the area of high archaeological potential, as described in NTL 2011-JOINT G01. However, Green Canyon blocks are subject to the recent mitigation guidelines released by the BOEM in March 2011 entitled "Pre-Seabed Disturbance Survey Mitigation", which require archaeological assessments prior to undertaking any bottom-disturbing activities.

Archaeological assessments for GC blocks were provided with a SDOCD for the Mad Dog Phase 2 suction piles at Drill Centers 1 and 4 Plan Control Number R-5632 approved November 14, 2012. These reports are:

Geoscience Earth & Marine Services, Inc (GEMS), 2012a, "Archaeological Assessment Mad Dog Phase 2.

AUV Survey Area Blocks 736-737, 780-782, 824-826, and 868-870, Green Canyon Protraction Area, Gulf of Mexico, USA", GEMS Report No. 0411-1916. Houston, Texas, USA.

Geoscience Earth & Marine Services, Inc (GEMS), 2012b,"Archaeological ROV Investigation, Blocks 824-826, and 869-870, Green Canyon Protraction Area, Gulf of Mexico, USA", GEMS Project No. 0811-1980. Houston, Texas, USA.

The archaeological assessment and geohazards assessment submitted with the Initial DOCD N-9830 approved March 5, 2015:


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Geoscience Earth & Marine Services, Inc (GEMS), 2011a, “Archaeological Assessment, Puma AUV Survey Area, Blocks 777-781, 821-826, 865-870, and 909-912, Green Canyon Protraction Area, U. S. Gulf of Mexico", GEMS Project No. 0411-1917.

Fugro GeoServices, Inc. (FGSI), 2006, “Geohazards Assessment, Puma Appraisal Area, Green Canyon Protraction Area, U.S. Gulf of Mexico”, Report No. 2406-2146.

The following report was submitted July 26, 2018 for the Exploration Plan Control No. N-10028 approved November 8, 2018:

Gardline Surveys, Inc., 2012, “3D Geohazard Assessment, Gulf of Mexico-Green Canyon, Blocks GC691-695, GC734-740, GC778-784, GC822-829, GC867-873, GC911-917, GC956-957 & GC1000-1001, Mad Dog Phase 2.” Gardline, Houston

# 7 Waste and Discharge 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 D**.

## 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 D**.

## 7.3 Modeling Report

No waste modeling report is required for this DOCD.


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# 8 Air Emissions Information

## 8.1 Screening Questions

| Yes | No | Screening Questions for DOCD's |
|---|---|---|
| X | | Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed development and production activities more than 90% of the amounts calculated using the following formulas: CT = 3400D2/3 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 H2S 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? |

## 8.2 Emissions Worksheet

An Excel Worksheet (Argos SWX BOEM Form 0139) showing calculated Plan Total Emissions associated with the activities proposed in the supplemental DOCD is provided in Attachment 1 and includes the wells for the Argos Southwest Expansion project (GC868 DC6 wells “C”, “D”, “E”). Complex total emissions are same as approved DOCD N-10048. 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 | GC-868 | OCS-G33859 | Argos | GC868 DC6 Wells "C", "D", "E" |

| Year | Facility Emitted Substance | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | TSP | PM10 | PM2.5 | SOx | NOx | VOC | Pb | CO | NH3 |
| 2024 | 99.52 | 60.04 | 58.24 | 1.45 | 2384.35 | 68.56 | 0.01 | 373.98 | 0.70 |
| 2025 | 177.38 | 107.02 | 103.81 | 2.58 | 4249.84 | 122.19 | 0.01 | 666.58 | 1.24 |
| 2026 | 177.38 | 107.02 | 103.81 | 2.58 | 4249.84 | 122.19 | 0.01 | 666.58 | 1.24 |
| 2027 | 102.33 | 61.74 | 59.88 | 1.49 | 2451.69 | 70.49 | 0.01 | 384.54 | 0.72 |
| Allowable | 4462.20 | | | 4462.20 | 4462.20 | 4462.20 | | 89032.54 | |

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## 8.3 Emission Reductions Measures

BP did not utilize any emission reduction measures in calculating emissions for the project. All emissions were calculated using the default values in the BOEM Form 0139.

## 8.4 Verification of Non-Default Emission Factors

No non-default emissions factors were used.

## 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 Facilities

The calculated maximum projected emissions 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 the Plan.

## 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

All proposed activities and facilities in this DOCD will be covered by the GoM Regional OSRP submitted by BP America Inc (Operator No. 21372) under cover letter dated October 7, 2022, on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on November 29, 2022.

Pursuant to 30 CFR 254.30(b), on July 12, 2022, BP submitted to BSEE a revision to the Oil Spill Response Plan referenced above. Revision changes are listed in the Record of Revision Form (Figure 2-1) of the revised OSRP.

BP has adopted additional performance standards:

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

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


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

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

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

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

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

### 9.1.2 Spill Response Sites

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

### 9.1.3 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 the ARGOS SWX project Green Canyon area.


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### 9.1.4 Worst-case Scenario Determination

| Category | Regional OSRP approved 11/29/2022 Drilling | MD2 Drilling | Regional OSRP approved 11/29/2022 Production | MD2 ARGOS Semi-Submersible Plan Production |
|---|---|---|---|---|
| Type of Activity | Drilling > 10 miles | Plan Drilling WCD > 10 miles | Production > 10 miles | Plan Production WCD > 10 miles |
| Facility Location | MC 778 | GC 825 DC1-A | MC 822 | GC 780 |
| Facility Designation | Thunder Horse Well MC 778 #15 | MODU GC825 DC1 Well A | Thunder Horse PDQ – MC822 #11 | ARGOS FPU Semisubmersible |
| Distance to Nearest Shoreline | 68-miles | 130 miles | 68-miles | 129 miles |
| **Volume** Facility Storage: | 0-bbls | 0-bbls | 0-bbls | 0-bbls |
| Max Tanks /Vessels & Flowlines | 50,000-bbls | 0-bbls | 50,000-bbls | 7,100-bbls |
| Lease Term pipelines | 13,000-bbls | 0-bbls | 13,000-bbls | 5,224--bbls |
| Daily Production Volume | 0-bbls | 0-bbls | 55,000-bbls | 35,000-bbls |
| Volume Uncontrolled Blowout (Day 1) | 360,000-bbls | 135,000-bbls | 0-bbls | 0-bbls |
| Total Volume | 423,000-bbls | 135,000-bbls | 118,000-bbls | 47,324-bbls |
| Type of Oil(s) – (Crude Oil, Condensate, Diesel) | Crude | Crude | Crude | Crude |
| API Gravity(s) | 32 | 24.5 | 33 | 27 |

BP has determined that the worst case scenario from the activities proposed in this plan does not supersede the worst case scenario in BP's GoM Regional OSRP filed by BP America, Inc. (Operator 21372), under cover letter dated October 7, 2022 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on 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 this DOCD, from the worst-case scenario in the Supplemental EP (Control Number S-07582) approved on November 28, 2012, 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 DOCD.

Wellbore data, geologic data, reservoir data, and fluid data used in modeling and developing the WCD determination for GC 825 DC1 Well A, were approved in the Supplemental EP S-07582 November 28, 2012.


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## 9.2 Oil Spill Response Discussion

A detailed discussion of a response to an oil spill in the Mad Dog field Green Canyon Blocks is included in **Appendix G.** This Appendix addresses topics such as resource identification, release modeling, response technologies, and source containment / control.

## 9.3 Modeling Report

No report is required for this DOCD.

# 10 Environmental Monitoring and Mitigation Measures

## 10.1 Monitoring Systems

In addition to rig control engineered systems, operational personnel have been instructed to check for pollution frequently during their tour of duty and, if pollution is spotted, to identify and shut-off the source and make immediate notifications as per instructions provided in Section 8 of BP's certified OSRP. In accordance with the measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended on April 26, 2021 [Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce (March 13, 2020, amended April 26, 2021)], a person onboard the vessel(s) will visually monitor the moonpool(s) using a remote camera system. Logs will be kept for each shift documenting the observed presence/absence of marine animals in the moonpool(s). If a protected species is observed in the moonpool(s), required reporting to the appropriate agencies will be made and BP will comply with ensuing guidance.

Also, in accordance with the provisions of Title 30 CFR § 250.713(g) and NTL 2018-G01 "Ocean Current Monitoring" dated August 7, 2018, the MODU will be equipped with an Acoustic Doppler Current Profile (ADCP) current monitoring system onboard to allow continuous monitoring and gathering of ocean current data on a real-time basis from 30 - 1000 meters.

## 10.2 Incidental Takes

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Monitoring activities are conducted by personnel on vessels to prevent accidental loss of materials overboard, and to report sightings of injured/dead protected species. Reporting of dead/injured protected species is addressed in Annex 2 of BP's "Incident Notification and Investigation Procedure - Attachment 1". Additionally, to mitigate against incidental takes, activities will be conducted in adherence to 2020 revisions of BSEE NTL 2015-G03 "Marine Trash and Debris Awareness Training and Elimination"; BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and BOEM NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program", as necessary. As required by BSEE NTL 2015-G03, BP submits an annual certification letter for its Marine Debris Awareness Training Process. The marine debris awareness training is required annually by the BSEE and is identified by "BP's Gulf of Mexico (GoM) Environmental Training Matrix" and "BP's GoM Health, Safety, and Environmental (HSE) Training Needs Assessment", both of which are located on BP's GoM HSE website.

Further mitigation measures can be found throughout the supporting EIA found in Appendix I.


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## 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

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

## 11.1 Lease Stipulation Information

Lease Stipulation for Protected Species

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Additionally, all activities will be conducted in adherence to 2020 revisions of NTL 2015-G03 "Marine Trash and Debris Awareness Training and Elimination"; BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and BOEM NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program", as necessary. Mitigation to prevent takes varies based on the activity underway and it can include worker training on waste management and trash and debris containment procedures to avoid accidental loss overboard and its potential impact on protected species, and training on reporting of dead/injured protected species addressed in BP's Incident Notification and Investigation Procedure.

The Mad Dog 2 project ARGOS FPU and the Drill Centers are located within the Military Warning Area W-92; therefore, in accordance with the requirements of the referenced stipulation, BP will contact the Fleet Area Control and Surveillance Facility for the proposed operations.

# 12 Related Facilities and Operations Information

## 12.1 Related OCS Facilities and Operations

BP chose to conform to the requirements of the American Bureau of Shipping (ABS) Class Floating Offshore Installation (FOI) for the MD2 project ARGOS FPU. The decision to "Class" the facility ensures conformance with statutory requirements and due diligence will be exercised during the service life of the facility. BP executed a contract with ABS which provided the required services through its design, fabrication, and installation activities for assurance that the facility complied with world-recognized and respected Standards. All marine systems are classified by ABS as required for FOI Class. Marine systems are those which are required to conduct marine operations and include ballast, vents, sounds, a center well and all equipment required to operate and support these systems in or on the hull. This is a manned platform which will process produced hydrocarbons from twenty-two (22) currently planned wet tree producers and inject water into fourteen (14) currently planned waterflood wells. BP will install six (6) drill centers for the total thirty-five (36) currently planned wells. This Supplemental DOCD is for one well and two re-spuds.

The subject wells will be equipped with subsea trees and will flow through subsea manifolds, connected via proposed flowlines with associated umbilicals and jumpers to BP's ARGOS semi-submersible floating platform in RUE OCS-G 30300 Green Canyon Block 780.


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BP has an approved Right-of-Use and Easement application for the unleased Green Canyon Block 780 for the installed ARGOS semi-submersible Floating Platform and for portions of the platform anchorage system.

ARGOS is tied into the existing Mardi Gras Pipeline System which includes the Caesar Oil Gathering System and the Cleopatra Gas gathering System. The Caesar pipeline transports the oil to two delivery points on the Texas Gulf Coast, Texas City or Beaumont/Port Author. The gas is transported by the existing Cleopatra, Manta Ray and Nautilus pipelines to the Neptune Gas Plant in Louisiana.

The proposed operations are not located within the Protective Zones of the State of Florida, Flower Garden Banks National Marine Sanctuary boundaries.

## 12.2 Transportation Systems

ARGOS FPU production is transported by two DOI Right-of-Way (ROW) pipelines to an existing pipeline infrastructure onto shore. The 16-inch ROW Oil Export Pipeline transports oil to the existing Caesar Oil Gathering System through the existing Neptune PLET P7 Pipeline Segment Number 15895 in Green Canyon Area Block 650 OCS-G-28091 offshore Louisiana and an 8-inch ROW Gas Export Pipeline transports gas to the existing Cleopatra Gas Gathering System through the existing Shenzi PLET P3A Pipeline Segment Number 17107 in Green Canyon Area Block 650 OCS-G-28091 offshore Louisiana.

## 12.3 Produced Liquid Hydrocarbons Transportation Vessels

| Transport Method | Vessel Capacity | Average Volume to be Loaded (per transfer) | No. of Transfers (Yearly Average) |
|---|---|---|---|
| Shuttle Tanker | 50,000-bbls | 40,000-bbls | 52 |

# 13 Support Vessels and Aircraft Information

## 13.1 Support Vessel and Aircraft Information Table

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

## 13.2 Diesel Oil Supply Vessels

| Size of Fuel Supply Vessel | Capacity of Fuel Supply Vessel | Frequency of Fuel Transfers | Route Fuel Supply Vessel will Take |
|---|---|---|---|
| 240-feet to 280-feet | 50,000-gallons (boat fuel)<br>150-K to 250-K gallons of transferable fuel (rig fuel) | Weekly / as needed | From the shorebase in Fourchon, LA, to GC 868 |


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## 13.3 Solid and Liquid Wastes Transportation and Disposal

The project will utilize existing waste facilities. Wastes generated from the proposed activities will be transported and disposed of at permitted sites, as determined by BP's contracted Waste Management Company. All offshore generated wastes are classified, and if needed, characterized, and all are properly containerized, labeled, marked and shipped in either directly to the onshore disposal facility, or to the BP shorebase facility. A table providing information on solid and liquid wastes generated by the proposed activities is included in Table 2 found in **Appendix D**.

## 13.4 Vicinity Map

A vicinity map depicting the location of the proposed activities is included in **Appendix B**. In accordance with Appendices A, B, C, and J of the NMFS 2020 Biological Opinion, as amended in 2021, transit routes will avoid the Rice's whale core distribution area. As outlined in the table below, vessels will transit from shorebases in Louisiana to the blocks where activities will occur under this plan.

# 14 Onshore Support Facilities Information

## 14.1 General

The onshore support base for the proposed operations will be in Fourchon, Louisiana. Green Canyon Block 868 is located approximately 134 miles from the nearest Louisiana shoreline and approximately 138 miles from the onshore support base located in Fourchon, Louisiana, as indicated on the vicinity map in **Appendix B.**

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

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

BP will primarily use the existing C-Port Fourchon Shorebase located in Fourchon, Lafourche 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 138-miles from the general activity area, provides a vehicle parking lot, office space, radio communication equipment, outside and warehouse storage space, crane, forklifts, water and fueling facilities, and boat dock space. The base is in operation 24-hours each day. Helicopters will be based out of Houma, Louisiana.

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

## 14.2 Support Base Construction or Expansion

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


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# 15 Coastal Zone Management Act (CZMA) Information

## 15.1 Consistency Certification

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

# 16 Environmental Impact Analysis (EIA)

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

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Additionally, BOEM (or its predecessor, the Minerals Management Service) has conducted extensive environmental analyses examining the possible impacts produced by oil and gas exploration and production activities, which evaluated impacts from similar activities on the areas in the Gulf of Mexico covered by the present plan.

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

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

The EIA outlines high level mitigation measures that will be in place to reduce associated potential impacts.

# 17 Administrative Information

## 17.1 Exempted Information Description

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

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

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

## 17.2 Bibliography

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


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| Plan Control No | Lease | Block | Operator Name | Operator Number | Plan Type Code | Received Date | Final Action Code | Final Action Date |
|---|---|---|---|---|---|---|---|---|
| N-6130 | G09982 | GC826 | BP America Production Company | 00114 | POE | 3/16/1998 | A | 4/22/1998 |
| S-5533 | G15610<br>G09982 | GC782<br>GC826 | BP Exploration & Oil Inc. | 01680 | EP | 1/25/2001 | A | 2/22/2001 |
| N-7415 | G15610<br>G09982 | GC782<br>GC826 | BP Exploration & Production Inc. | 02481 | DOCD | 3/29/2002 | A | 12/3/2002 |
| R-3929 | G09982 | GC826 | BP Exploration & Production Inc. | 02481 | EP | 7/18/2003 | A | 8/5/2003 |
| R-3962 | G09982 | GC826 | BP Exploration & Production Inc. | 02481 | EP | 9/24/2003 | A | 10/6/2003 |
| S-6504 | G09981<br>G09982 | GC825<br>GC826 | BP Exploration & Production Inc. | 02481 | EP | 8/23/2004 | A | 9/7/2004 |
| S-6530 | G15610<br>G09982 | GC782<br>GC826 | BP Exploration & Production Inc. | 02481 | EP | 9/21/2004 | A | 10/15/2004 |
| S-7142 | G16808<br>G16809<br>G16823 | GC823<br>GC824<br>GC868 | BP Exploration & Production Inc. | 02481 | EP | 10/25/2007 | A | 11/15/2007 |
| S-7233 | G15609<br>G15610<br>G09981 | GC781<br>GC782<br>GC825 | BP Exploration & Production Inc. | 02481 | DOCD | 4/3/2008 | A | 6/13/2008 |
| N-9176 | G09981<br>G09982 | GC825<br>GC826 | BP Exploration & Production Inc. | 02481 | DOCD | 4/3/2008 | X | 6/13/2008 |
| S-7290 | G09981<br>G09982 | GC825<br>GC826 | BP Exploration & Production Inc. | 02481 | EP | 12/4/2008 | A | 1/16/2009 |
| N-9475 | G09981<br>G09982<br>G28100<br>G28101 | GC825<br>GC826<br>GC869<br>GC870 | BP Exploration & Production Inc. | 02481 | EP | 12/14/2009 | A | 2/19/2010 |
| R-5519 | G15609<br>G15610<br>G09981<br>G09982 | GC781<br>GC782<br>GC825<br>GC826 | BP Exploration & Production Inc. | 02481 | DOCD | 4/1/2012 | A | 1/7/2013 |
| R-5632 | G09981 | GC825 | BP Exploration & Production Inc. | 02481 | DOCD | 6/13/2012 | A | 11/14/2012 |
| S-7582 | G09981<br>G09982<br>G28100 | GC825<br>GC826<br>GC869 | BP Exploration & Production Inc. | 02481 | EP | 9/4/2012 | A | 11/28/2012 |
| N-9830 | G30300<br>G15609<br>G15610<br>G33685<br>G09981<br>G09982<br>G28100<br>G28101 | GC 780<br>GC 781<br>GC 782<br>GC 824<br>GC825<br>GC826<br>GC869<br>GC 870 | BP Exploration & Production Inc | 02481 | DOCD | 8/15/2014 | A | 3/5/2015 |
| N-10028 | G36056<br>G09982 | GC 870<br>GC 826 | BP Exploration & Production Inc | 02481 | EP | 8/15/2018 | A | 11/8/2018 |
| N-10048 | G09981<br>G09982<br>G28100<br>G33859 | GC 825<br>GC 826<br>GC 869<br>GC 868 | BP Exploration & Production Inc | 02481 | DOCD | 12/3/2018 | A | 7/19/19 |


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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| R-7167 | G30300 | GC 780 | BP Exploration & Production Inc | 02481 | DOCD | 3/7/2022 | | |

## 17.3 Other Reference Items


BP, September 2010. "Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned."

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

Geoscience Earth & Marine Services, Inc (GEMS), 2011a,"Mad Dog Area, High-resolution 3D geohazard assessment, blocks 695, 737-740, 780-784, 824-828, 869-871, Green Canyon Protraction Area, U. S. Gulf of Mexico", GEMS Project No. 0410-1775. Houston, Texas, USA.

Geoscience Earth & Marine Services, Inc (GEMS), 2011b,"Geologic and Stratigraphic Assessment, Mad Dog Phase 2 AUV Survey Area, Blocks 736-737, 780-782, 824-826, and 868-870, Green Canyon Protraction Area, U. S. Gulf of Mexico", GEMS Project No. 0410-1774. Houston, Texas, USA.

Geoscience Earth & Marine Services, Inc (GEMS), 2012a, ”Archaeological Assessment Mad Dog Phase 2

AUV Survey Area Blocks 736-737, 780-782, 824-826, and 868-870, Green Canyon Protraction Area, Gulf of Mexico, USA”, GEMS Report No. 0411-1916. Houston, Texas, USA.

Geoscience Earth & Marine Services, Inc (GEMS), 2012b,"Archaeological ROV Investigation, Blocks 824-826, and 869-870, Green Canyon Protraction Area, Gulf of Mexico, USA”, GEMS Project No. 0811-1980. Houston, Texas, USA.

Fugro GeoServices, Inc. (FGSI), 2006, “Geohazards Assessment, Puma Appraisal Area, Green Canyon Protraction Area, U.S. Gulf of Mexico”, Report No. 2406-2146.

Geoscience Earth & Marine Services, Inc (GEMS), 2011a, “Archaeological Assessment , Puma AUV Survey Area, Blocks 777-781, 821-826, 865-870, and 909-912, Green Canyon Protraction Area, U. S. Gulf of Mexico", GEMS Project No. 0411-1917.

Gardline Surveys, Inc., 2012, “3D Geohazard Assessment, Gulf of Mexico-Green Canyon, Blocks GC691-695, GC734-740, GC778-784, GC822-829, GC867-873, GC911-917, GC956-957 & GC1000-1001, Mad Dog Phase 2.” Gardline, Houston


## 17.4 Recovery Fees

**Appendix K** contains a copy of the receipt showing the payment required by 30 CFR Part 250.125.



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# 18 Appendixes

Appendix A: Plan Information Forms – Form BOEM-0137

Appendix B: Vicinity Plats and Location Plats

Appendix C: Geological & Geophysical Information (Geological Description, Structure Contour Maps, Interpreted Seismic Lines, Geological Structure Cross-Section Maps, Stratigraphic Column, Time vs Depth, Shallow Hazards Assessments (Site Clearance Letters for Drill Centers, pre-lay of moorings and wet parking pipeline risers),

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

Appendix E: Air Emissions Information – Form BOEM-0139

Appendix F: WCD Modeling Report for GC825 - Previously approved on November 28, 2012 in the Supplemental EP Control Number S-07582

Appendix G: Oil Spill Response Discussion

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

Appendix I: Environmental Impact Analysis (EIA)

Appendix J: New Technology

Appendix K: Fee Recovery


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

# OCS PLAN INFORMATION FORM – Public Information

## General Information

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

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

| | | | | |
|---|---|---|---|---|
| If a service fee is required under 30 CFR 550.125(a), provide the | Amount paid | $5,017.00 | Receipt No. | 76581471599 |

## Project and Worst Case Discharge (WCD)Information

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lease(s): OCS G09981 and G33859 | Area: GC | Block(s): 825, 868 | Project Name (if applicable): ARGOS Southwest Expansion | | | | | | |
| Objective(s): | X | Oil | | Gas | | Sulphur | | Salt | Onshore Support Base(s): Fourchon, LA |
| Platform/Well Name: ARGOS | Total Volume of WCD: 11.51 MMSTBO | | | | | | | | API Gravity: 24.5 |
| Distance to Closest Land (Miles): 130 Miles | Volume from uncontrolled blowout: 135,000 bopd | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| 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. | EP S-07582 | | | |
| 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? | X | Yes | | No |

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

| Proposed Activity | Start Date | End Date | No. of Days |
|---|---|---|---|
| Drill, complete & produce Drill Center 6 (DC6) Well C | 08-03-2024 | 03-07-2025 | 150 + 66 = 216 |
| Drill, complete & produce Drill Center 6 (DC6) Well D | 07-01-2025 | 03-07-2026 | 184 + 66 = 250 |
| Drill, complete & produce Drill Center 6 (DC6) Well E | 07-01-2026 | 05-30-2027 | 184 + 150 = 334 |
| | | | |

## Description of Drilling Rig

| | | | |
|---|---|---|---|
| | Jackup | X | Drillship |
| | Gorilla Jackup | | Platform Rig |
| | Semisubmersible | | Submersible |
| X | DP Semisubmersible | | Other (attach description) |

Drilling Rig Name (if known):

## Description of Structure

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

## Description of Lease Term Pipelines

| From (Facility/Area/Block) | To (Facility/Area/Block) | Diameter (Inches) | Length (Feet) |
|---|---|---|---|
| GC 868 DC6 Well C | GC 868 DC6 Manifold1 | 6” | 120’ |
| GC 868 DC6 Well D | GC 868 DC6 Manifold1 | 6” | 120’ |
| GC 868 DC6 Well E | GC 868 DC6 Manifold1 | 6” | 120’ |
| GC 868 DC6 Manifold1 | GC 868 DC6 P5-2 PLET | 8” | 120’ |
| GC 868 DC6 Manifold1 | GC 868 DC6 P6-2 PLET | 8” | 120’ |
| GC868 DC6 Manifold1 | GC868 DC6 Manifold1 | 8” | 20’ |
| GC 825 DC2 P5-1 PLET | GC 825 DC2 PLEM3 | 8” | 120’ |
| GC 825 DC2 P6-1 PLET | GC 825 DC2 PLEM3 | 8” | 120’ |

| | | | |
|---|---|---|---|
| GC 825 DC2 PLEM3 | GC 825 DC2 Manifold2 | 8” | 120’ |
| GC 825 DC2 PLEM3 | GC 825 DC2 Manifold2 | 8” | 120’ |
| | | | |
| | | | |
| | | | |
| | | | |

**PUBLIC INFORMATION**

# 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) **DC6-C** | | | | Previously reviewed under an approved EP or DOCD? New Location not reviewed | | 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) 135,000 stb/day | | | For structures, volume of all storage and pipelines (Bbls) N/A | | API Gravity of fluid | | 24.5° | |
| | **Surface Location** | | | **Bottom-Hole Location (For Wells)** | | **Completion (For multiple completions, enter separate lines)** | | | |
| **Lease No.** | OCS-G 33859 | | | OCS-G | | OCS-G | | | |
| **Area Name** | GC | | | | | | | | |
| **Block No.** | 868 | | | | | | | | |
| **Block Line Departures (in feet)** | N/S Departure: 1774.50’ FNL | | | N/S Departure: | | N/S Departure: | | | |
| | E/W Departure: 4550.95’ FWL | | | E/W Departure: | | E/W Departure: | | | |
| **Lambert X-Y coordinates** | X: 2,491,430.95’ | | | X: | | X: | | | |
| | Y: 9,850,705.50’ | | | Y: | | Y: | | | |
| **Latitude / Longitude** | Latitude: 27° 07’ 19.829” N NAD27 | | | Latitude: | | Latitude: | | | |
| | Longitude: 90° 23’ 00.005” W NAD27 | | | Longitude: | | Longitude: | | | |
| Water Depth (Feet): 4,367 | | | | MD (Feet): | TVD (Feet): | 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** |
| | | | X= | Y= | **No Anchor locations are proposed in this DOCD** |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |

**PUBLIC INFORMATION**

## 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) **DC6-D** | | | | Previously reviewed under an approved EP or DOCD? New Location not reviewed | | 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) 135,000 stb/day | | | For structures, volume of all storage and pipelines (Bbls) N/A | | API Gravity of fluid | | 24.5° |
| | **Surface Location** | | | **Bottom-Hole Location (For Wells)** | | **Completion (For multiple completions, enter separate lines)** | | |
| **Lease No.** | OCS-G 33859 | | | OCS-G | | OCS-G | | |
| **Area Name** | GC | | | | | | | |
| **Block No.** | 868 | | | | | | | |
| **Block Line Departures (in feet)** | N/S Departure: 1808.29’ FNL | | | N/S Departure: | | N/S Departure: | | |
| | E/W Departure: 4353.36’ FWL | | | E/W Departure: | | E/W Departure: | | |
| **Lambert X-Y coordinates** | X: 2,491,233.36’ | | | X: | | X: | | |
| | Y: 9,850,671.71’ | | | Y: | | Y: | | |
| **Latitude / Longitude** | Latitude: 27° 07’ 19.535” N NAD27 | | | Latitude: | | Latitude: | | |
| | Longitude: 90° 23’ 02.198” W NAD27 | | | Longitude: | | Longitude: | | |
| Water Depth (Feet): 4,362 | | | | MD (Feet): | TVD (Feet): | 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** |
| | | | X= | Y= | **No Anchor locations are proposed in this DOCD** |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |

**PUBLIC INFORMATION**

# 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) **DC6-E** | | | | Previously reviewed under an approved EP or DOCD? New Location not reviewed | | 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 |

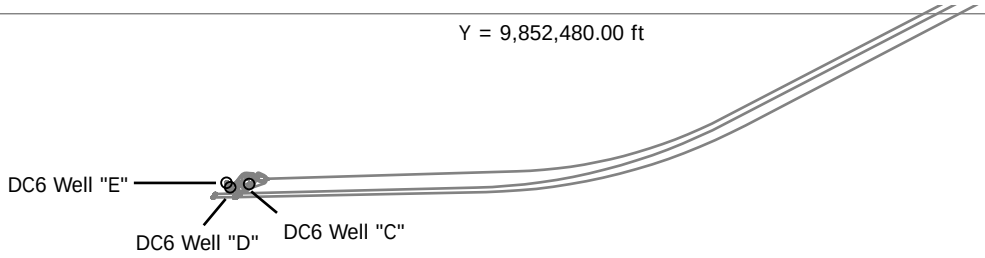
| | | | | | |
|---|---|---|---|---|---|
| **WCD info** | For wells, volume of uncontrolled blowout (Bbls/day) 135,000 stb/day | For structures, volume of all storage and pipelines (Bbls) N/A | | API Gravity of fluid | 24.5° |
| | **Surface Location** | **Bottom-Hole Location (For Wells)** | | **Completion (For multiple completions, enter separate lines)** | |
| **Lease No.** | OCS-G 33859 | OCS-G | | OCS-G | |
| **Area Name** | GC | | | | |
| **Block No.** | 868 | | | | |
| **Block Line Departures (in feet)** | N/S Departure: 1761.52’ FNL | N/S Departure: | | N/S Departure: | |
| | E/W Departure: 4314.98’ FWL | E/W Departure: | | E/W Departure: | |
| **Lambert X-Y coordinates** | X: 2,491,194.98’ | X: | | X: | |
| | Y: 9,850,718.48’ | Y: | | Y: | |
| **Latitude / Longitude** | Latitude: 27° 07’ 20.006” N NAD27 | Latitude: | | Latitude: | |
| | Longitude: 90° 23’ 02.612” W NAD27 | Longitude: | | Longitude: | |
| Water Depth (Feet): 4,360 | | MD (Feet): | TVD (Feet): | MD (Feet): | TVD (Feet): |
| Anchor Radius (if applicable) in feet: N/A | | n/a | | | |

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

| Anchor Name or No. | Area | Block | X Coordinate | Y Coordinate | Length of Anchor Chain on Seafloor |
|---|---|---|---|---|---|
| | | | X= | Y= | **No Anchor locations are proposed in this DOCD** |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |
| | | | X= | Y= | |

**PUBLIC INFORMATION**

## Appendix B: Vicinity Plats and Location Plats




Grid North
N

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

X = 2,486,880.00 ft

X = 2,502,720.00 ft

# *GC868*

*OCS-G 33859*
*BP Exp & Prod*

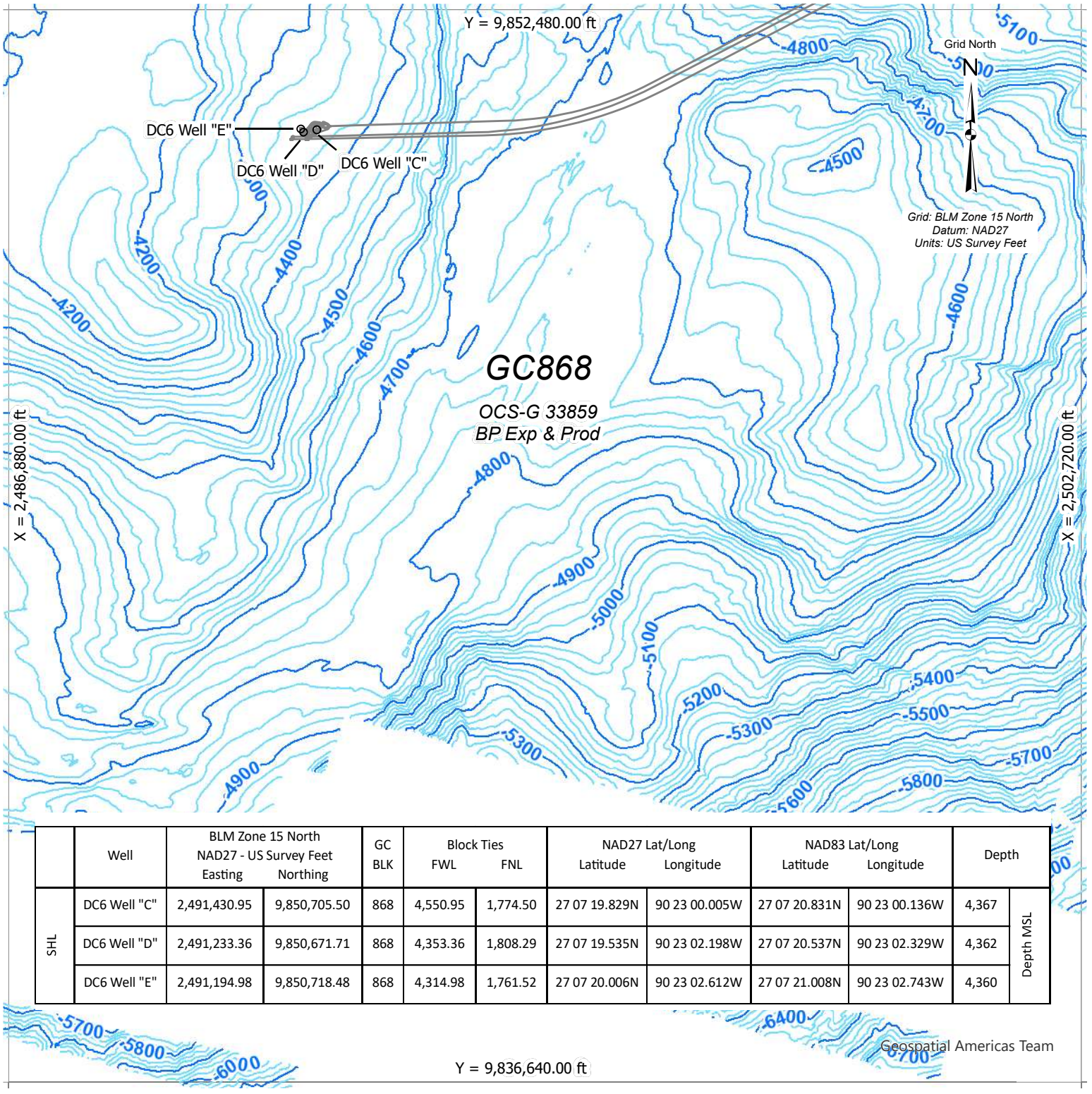
| | Well | BLM Zone 15 North NAD27 - US Survey Feet Eastng | Northing | GC BLK | Block Ties FWL | FNL | NAD27 Lat/Long Lattude | Longitude | NAD83 Lat/Long Lattude | Longitude | Depth | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHL | DC6 Well "C" | 2,491,430.95 | 9,850,705.50 | 868 | 4,550.95 | 1,774.50 | 27 07 19.829N | 90 23 00.005W | 27 07 20.831N | 90 23 00.136W | 4,367 | Depth MSL |
| | DC6 Well "D" | 2,491,233.36 | 9,850,671.71 | 868 | 4,353.36 | 1,808.29 | 27 07 19.535N | 90 23 02.198W | 27 07 20.537N | 90 23 02.329W | 4,362 | |
| | DC6 Well "E" | 2,491,194.98 | 9,850,718.48 | 868 | 4,314.98 | 1,761.52 | 27 07 20.006N | 90 23 02.612W | 27 07 21.008N | 90 23 02.743W | 4,360 | |

Y = 9,836,640.00 ft

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 and BHL data based upon BSEE data as of August 2023 and internal BP sources;

*"Public"*

| | | |
|---|---|---|
| bp | BP EXPLORATION AND PRODUCTION | Scale 1" = 2000 ft |
| | *Proposed Well Locations OCS-G33859 GC868 Wells "C", "D", "E"* | Date: 10/12/2023 |
| | *Green Canyon Area (OPD# NG15-03) Block 868* *Offshore Federal* | |
| | *Plat prepared by: Ian Dootson (BP Solutions)* | ID |

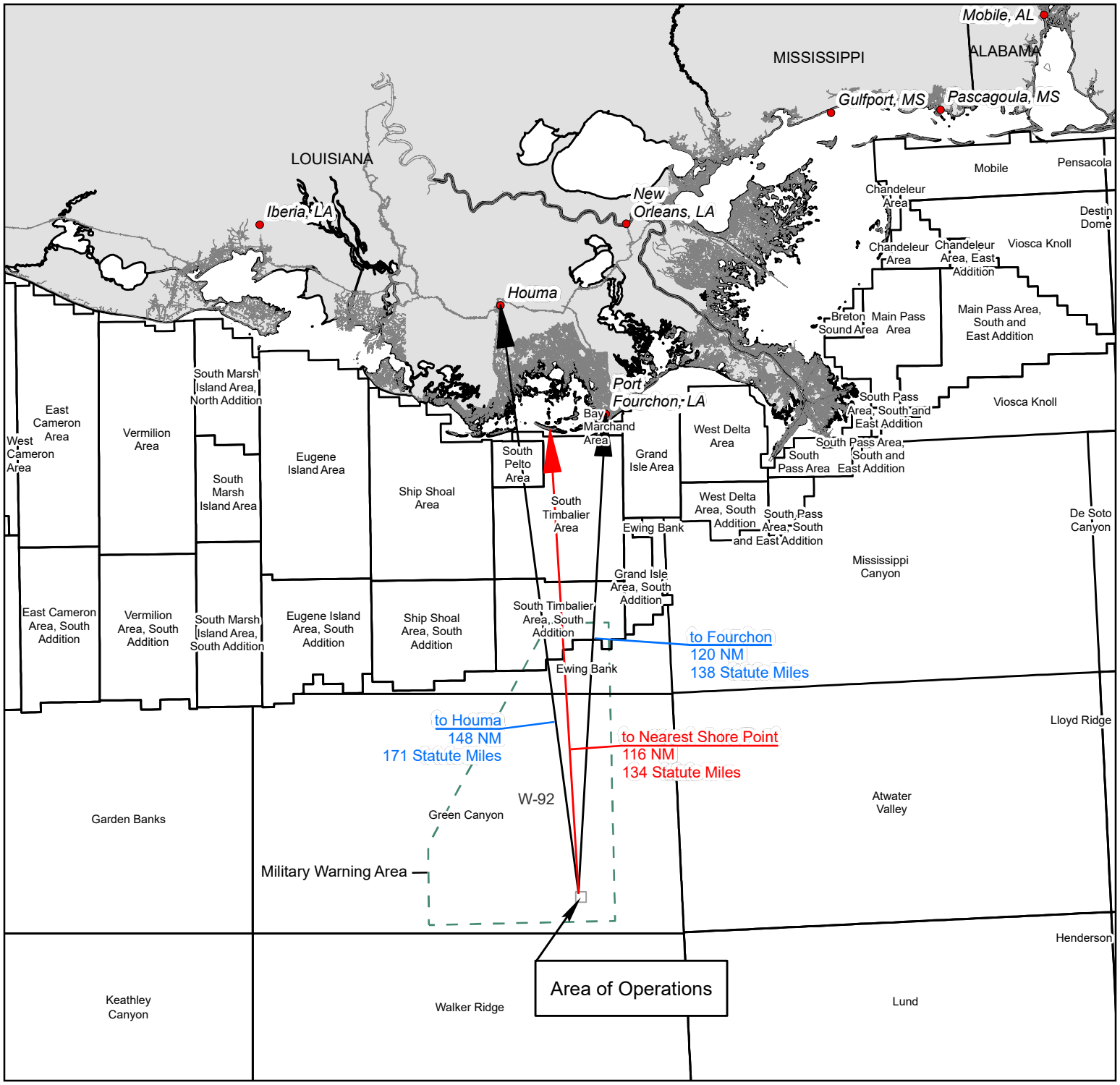



| | Well | BLM Zone 15 North NAD27 - US Survey Feet Easting | Northing | GC BLK | Block Ties FWL | FNL | NAD27 Lat/Long Latitude | Longitude | NAD83 Lat/Long Latitude | Longitude | Depth | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHL | DC6 Well "C" | 2,491,430.95 | 9,850,705.50 | 868 | 4,550.95 | 1,774.50 | 27 07 19.829N | 90 23 00.005W | 27 07 20.831N | 90 23 00.136W | 4,367 | Depth MSL |
| | DC6 Well "D" | 2,491,233.36 | 9,850,671.71 | 868 | 4,353.36 | 1,808.29 | 27 07 19.535N | 90 23 02.198W | 27 07 20.537N | 90 23 02.329W | 4,362 | |
| | DC6 Well "E" | 2,491,194.98 | 9,850,718.48 | 868 | 4,314.98 | 1,761.52 | 27 07 20.006N | 90 23 02.612W | 27 07 21.008N | 90 23 02.743W | 4,360 | |

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 and BHL data based upon BSEE data as of August 2023 and internal BP sources;
4) Bathymetry derived from 2014 AUV data

## *"Bathymetry"*

| | | |
|---|---|---|
| bp | BP EXPLORATION AND PRODUCTION | Scale 1" = 2000 ft |
| | *Proposed Well Locations OCS-G33859 GC868 Wells "C", "D", "E"* | Date: 10/12/2023 |
| | *Green Canyon Area (OPD# NG15-03) Block 868* *Offshore Federal* | |
| | *Plat prepared by: Ian Dootson (BP Solutions)* | ID |




Note: DC6 Well "D" in GC868 used for distance calculations to the shoreline. The shoreline used is the NOAA 1:24K Continuously Updated Shoreline Product (CUSP).

Grid North

N
W E
S

*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-G33859 GC868 Wells "C", "D", "E"* | Date: 10/12/2023 |
| | *Green Canyon Area (OPD# NG15-03) Block 868* *Offshore Federal* | |
| | *Plat prepared by: Ian Dootson (BP Solutions)* | ID |

**Appendix C:** **Geological & Geophysical Information (Geological Description, Structure Contour Maps, Interpreted Seismic Lines, Geological Structure Cross-Section Maps, Stratigraphic Column, Time vs Depth, Shallow Hazards Assessments for Wells, Mooring Pre-Lay & Wet Parking Risers (Site Clearance Letters),**

# SITE CLEARANCE LETTER
## MAD DOG 2 PROPOSED DRILL CENTER 6,
## BLOCK 868, OCS-G-33859
## GREEN CANYON AREA

| PROPOSED SURFACE LOCATION – DC6 WELL "C" | |
|---|---|
| 90° 23' 0.005" W | 27° 07' 19.829" N |
| X = 2,491,430.95 ft E | Y = 9,850,705.50 ft N |
| 1,775 FNL | 4,551 FWL |
| Water Depth: | 4,367 ft below MSL |

| PROPOSED SURFACE LOCATION – DC6 WELL "D" | |
|---|---|
| 90° 23' 2.198" W | 27° 07' 19.535" N |
| X = 2,491,233.36 ft E | Y = 9,850,671.71 ft N |
| 1,808 FNL | 4,353 FWL |
| Water Depth: | 4,362 ft below MSL |

| PROPOSED SURFACE LOCATION – DC6 WELL "E" | |
|---|---|
| 90° 23' 2.612" W | 27° 07' 20.006" N |
| X = 2,491,194.98 ft E | Y = 9,850,718.48 ft N |
| 1,762 FNL | 4,315 FWL |
| Water Depth: | 4,360 ft below MSL |

**X and Y Coordinates in UTM 15N (US Survey ft)**
**Geodetic Datum: NAD 1927**
**Spheroid: Clarke 1866**

# MAD DOG 2 DRILL CENTER 6 WELLS "C", "D", AND "E"

## BLOCK 868, OCS-G33859

## GREEN CANYON AREA, GULF OF MEXICO, USA

**Introduction.** This wellsite clearance letter addresses the shallow hazards for proposed Mad Dog 2 Drill Center 6 (MD2 DC6) GC868 "C", GC868 "D", and GC868 "E" wells, Green Canyon, Gulf of Mexico (OCS-G33859). This letter is intended to address specific seafloor and shallow geologic conditions within 2,000 ft of the proposed wellsites from the seafloor (4,362 ft Total Vertical Depth Sub-Sea; TVDSS) to about 9,200 ft TVDSS based on reprocessed 3D seismic, autonomous underwater vehicle (AUV) data and offset well data. The wells are assumed as vertical in the top-hole section. The MD2 DC6 locations are within 250 ft of each other and are described together in this letter as shallow geologic conditions are expected to be very similar. BP plans to drill the proposed wells from a dynamically positioned vessel, therefore an anchoring assessment is not required.

This letter supports the supplemental Development Operations Coordination Document (SDOCD) to be submitted and complies with Bureau of Ocean Energy Management (BOEM) guidelines provided in Notice to Lessees (NTL) 2011-JOINT-G01, 2008-G04, 2022-G01 and 2005-G05 (BOEM, 2014, 2011, 2010, 2008a, 2008b and 2005). This letter is supported by a comprehensive Archaeological assessment by Geoscience Earth & Marine Services, Inc. (GEMS) in 2011 (GEMS, 2011), a regional 3D seismic-based Shallow Hazards study, across multiple blocks in the area, by Gardline Surveys, Inc. in 2012 (Gardline, 2012), and a comprehensive Geohazards assessment done by Fugro Geoservices, Inc. in 2006 (FGSI, 2006). The GEMS and FGSI reports are based on AUV site survey data acquired in 2006 by C&C Technologies, Inc. and were submitted to the BOEM as supplementary documentation for the 2012 DOCD for MD2 DC1 and DC4, and 2012 EP for MD2 DC1, DC2, and DC4. MD2 DC6 "A" and "B" locations were included in the initial DOCD cleared (N-10048) that was approved on July 19, 2019. The Gardline report was submitted with the previous DOCD. The text, maps, and plates included in the GEMS, Gardline and FGSI reports provide detail on the regional geology of the Study Area. This letter is intended to supplement those reports with detailed site-specific interpretation conducted by BP at the proposed MD2 DC6 "C", "D", and "E" wellsites using reprocessed seismic data.

**Attachments.** Seafloor plates (1, 2, 3, 4 and 5) are centered on the as-drilled GC868 #1 wellsite. Plates are displayed at a 1 inch = 1,000 ft scale (1:12,000). A 2,000-ft radius circle around the proposed wellsites is also shown on the Seafloor Plates.

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

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

- Sub-Surface Geologic Features
- Portion of AUV Subbottom Line 178.1.a.0.et.subb.part-02
- 3D Seismic Inlines (6618) and Crossline (3889) Across Proposed Well Trajectory
- Top-hole Prognosis Chart for Proposed MD2 DC6 "C", "D" and "E"

**3D Seismic Survey Parameters.** An exploration 3D seismic volume that was reprocessed specifically for shallow hazards interpretation was used for this assessment (Plates 8, 9, and 10). The original exploration 3D seismic volume was acquired and processed by WesternGeco in 1996 and was reprocessed in 2011 by Geotrace to enhance the high-frequency content and shallow subsurface imaging. The data contains frequencies up to 61 Hz at the 50% power level yielding a vertical resolution of ~23 ft assuming a sound velocity of 5,800 ft/sec. The data was converted to a depth volume using a BP velocity model for the Mad Dog area. This reprocessed 3D seismic volume does a good job of imaging the simple structure above the Sigsbee Escarpment at MD2. The total uncertainty in depth below sea surface to horizons and other subsurface features is the sum of the water depth uncertainty (±20 ft) and the subseafloor uncertainty (±3.0 %).

**Autonomous Underwater Vehicle (AUV) Survey Data.** The 2006 AUV survey acquired multibeam swath bathymetry (Plates 1 through 3), multibeam backscatter (Plate 4), side scan sonar (Plate 5), and sub-bottom profiler data (Plate 7). AUV survey layout consisted of 130 primary lines and 27 tie lines. Line spacing was 200 m (656 ft) for the primary lines and tie lines were spaced 450 m (1,476 ft) in the west central portion of the study area and 900m (2,953 ft) elsewhere. Geohazards interpretation and archaeological assessments based on this data are provided in FGSI (2006) and GEMS (2011), respectively.

**Offset Well Data.** Relevant information from GC868 #1, Puma 1 GC823 #1, Puma 2 GC821 #1 wells; and BP's general drilling history within the area, was used to support the assessments made in this report.

**Archaeological Resource Survey Requirement.** No archaeologically significant objects were identified within 2,000 ft of the proposed well locations (GEMS, 2011).

## SEAFLOOR CONDITIONS

**Water Depth and Seafloor Gradient.** The water depth at the proposed MD2 DC6 "C", "D", and "E" locations is predicted to be 4,367 ft TVDSS, 4,362 ft TVDSS and 4,360 ft TVDSS respectively. The depth is derived from AUV Multibeam Bathymetry data (Plates 1 and 2). The local seafloor gradient is about 1.7 degrees to the southeast (Plate 3).

**Seafloor Features.** The proposed wells are situated on top of the Sigsbee Escarpment, in a relatively flat area surrounded by seafloor scarps related to previous slope failures and seafloor faulting (Plates 1, 2 and 3). Shallow, mobile salt has increased the occurrence of seafloor faults overlying the salt highs. Many of these faults are associated with scarps around the Sigsbee Escarpment. However, fault activity is low, with less active salt deformation during periods of low sediment loading. No erosional features were observed within 2,000 ft of the proposed wellsites.

**Man-Made Obstructions.** There is no existing infrastructure near DC6, and no significant debris that could impact drilling was detected in sonar data within at least 2,000 ft of any of the proposed well locations (Plate 5). The complete list of sonar contacts is discussed in GEMS (2011). DC6 "C", "D", and "E" lie within Military Warning Area W-92. The U.S. Military requires prior notification of all operations in the area. The proposed wells are not located within a known chemical or munitions dump, and no potential hazardous wastes or unexploded ordnance were detected in the survey area.

**Seafloor Debris.** Although seafloor debris was identified on the AUV survey data within 2,000 ft of the proposed well, none was detected at the proposed well location. The nearest

debris identified in the AUV data is about 1,000 ft northeast of the proposed wells, and will not constrain drilling at "C", "D", and "E" (Plate 5). None of the debris is considered archaeologically significant.

**Slope Stability.** Several seafloor scarps related to previous slope failures are present in the area (Plate 8, 9 and 10). The slope failures are related to slope instability caused by post depositional mobile salt during rapid sediment loading. These slope failures occurred both before and after the extensive "triplet" horizon (~20,000 years old) observed on the sub-bottom profiler data (Plate 7). Sub-bottom profiler records show a geologically young post triplet slump deposit north of the DC6 location.

A geotechnical slope stability analysis and assessment of the potential impact of slope failures on DC6 wells was conducted by BP, and indicates generally stable slopes in the area with a very low probability of future slope failures that could damage DC6 wells. The proposed wellbores will, however, penetrate a rotated slump block slip surface at about 4,635 feet TVDSS, and the soils below this contact may be stiffer than the overlying sediments.

**Potential High-Density Benthic Communities.** There is no geophysical evidence of seafloor hardgrounds or active hydrocarbon seepage features that could potentially support high-density benthic communities within 2,000 ft of the proposed location (Plates 1, 2, 4, 5, and 7) based on the AUV multibeam bathymetry, backscatter, side-scan sonar and sub-bottom profiler data.

## SUBSURFACE CONDITIONS

**Stratigraphy.** The stratigraphy of the top-hole section at the proposed MD2 DC6 "C", "D" and "E" locations, as exhibited by the AUV sub-bottom profiler and reprocessed 3D seismic data, consists of approximately 2,767 ft of deep-water sediments and 1,990 ft of salt between the seafloor and the depth limit of investigation (9,200 ft TVDSS; Plates 7, 8, 9, and 10). The top-hole section comprises predominantly of fine-grained, stacked sequences of laterally extensive clays, silts, and sand interbeds, mass transport deposits, and salt.

The seafloor and eight subsurface horizons (Horizon 10, 20, 50, 60, 80, 90, 95, and 96) were mapped in the subsurface study area and follow the horizon nomenclature of Gardline (2012). These Horizons divide the supra-salt section into seven main units (Units A through G). The stratigraphic interpretations and inferred lithologies are based primarily on the character of the 3D reprocessed seismic, AUV data, and GC868 #1 well results. Predicted depths and thicknesses associated with each of the mapped horizons and sequences are displayed on the attached Top-hole Prognosis Chart for the proposed MD2 DC6 "C", "D", and "E" drilling locations (Plate 10).

Plate 7 represents the closest Southwest-Northeast sub-bottom profiler line to the proposed well locations, which is about 150-380 ft west-northwest of the wells, and shows an approximate 153 ft thick sequence (Unit A) of laterally extensive hemipelagic clays and silts with interbedded, fine grained mass transport deposits. Unit B is characterized by a 26 ft sequence of clays, silts and small mass transport deposits.

Sediments below H20 (top of Unit C) are interpreted from 3D seismic data. Unit C is characterized by a 147 ft thick sequence of slightly chaotic reflectors overlying well layered clays and silts. Unit D is comprised of well-layered and chaotic reflectors interpreted as a clay rich unit with silt interbeds and lenses. Unit E is clay-rich with fine grained mass

transport deposits and sand lenses at the base of Unit F. Unit G consists predominately of well layered silt and clays interbedded with mass transport deposits and possible sand lenses in the middle of the unit and sand interbeds in the lower section of the unit.

**Fault Penetrations**. No faults will be penetrated by the wells at DC6. However, faults are observed near the wellbore and are most likely caused by post-depositional mobile salt movement (Plate 8, 9 and 10). These faults are unlikely to have any detrimental effect on drilling operations or the integrity of well conductors.

**Shallow Gas**. There is **Negligible** potential for encountering shallow gas while drilling the top-hole section of the DC6 wells. Amplitude anomalies with characteristics of shallow gas are observed up-dip and away from the wellbore (Plates 6, 8, 9 and 10). Plate 6 shows the distribution of amplitude anomalies mapped from the reprocessed 3D seismic dataset. Based on GC868 #1 results, amplitudes in proximity of the proposed well locations are interpreted to represent lithology not shallow gas.

**Gas Hydrate**. The potential for encountering massive gas hydrate accumulations is ranked as **Negligible** at the proposed wellbores. A bottom simulating reflector (BSR) is observed in the reprocessed 3D seismic volume and the interpreted depth to the base of gas hydrate stability (BGHS) is estimated to be 1,183 ft BML at the wells.

**Shallow Oil**. Shallow oil has been observed while drilling the riserless section of wells west of DC6, though no droplets were observed during the riserless drilling at GC868 #1 and logs and cuttings did not observe any shows or fluorescence between the containment string and top of salt. The proposed wells are up to 210 ft from the drilled GC868-1 well and have a **Negligible** potential for shallow oil for the riserless section (Plate 10).

**Shallow Water Flow (SWF)**. SWF has occurred at offset wells northwest and northeast of DC6 in similar stratigraphic units as DC6 in the area. The shallow stratigraphy at MD2 DC6 "C", "D" and "E" development locations consist of interbedded hemi-pelagic clays, turbidites, and rapidly deposited mass transport complexes interbedded with thin sands. These rapidly deposited mass transport complexes can be locally over-pressured or have caused underlying sands to become over-pressured.

GC868 #1 did not encounter any SWF intervals down to upper portion of Unit G where the first pressure containment shoe was placed and no abnormal pressure was noted in the remainder of the suprasalt section. Offset wells that encountered GC823 #1 and GC821 #1 experienced SWF in various intervals while drilling with both seawater and pump and dump mud. Other wells in the Mad Dog area have also experienced slight SWF in deeper sand intervals that did not affect drilling operations.

The potential sand-prone intervals within the lower portion of Unit F and middle to lower portion of Unit G are interpreted to have the potential for SWF at DC6 and are ranked with **Low** potential for shallow water flow as shown on Plate 10. The remainder of the top-hole section in the proposed wells is ranked as **Negligible** potential for shallow water flow.

**Closing**. The MD2 DC6 "C", "D" and "E" well locations appear to be generally favorable for well drilling operations. We advise caution based on this assessment, but believe the risk of danger to personnel and damage to the borehole, equipment and environment is generally low, provided strict adherence to proper drilling and cementing procedures is followed concerning these hazards until the first pressure containment string is in place.

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October 18, 2023

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November 17, 2023

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ATTACHMENTS:

Plate 1 AUV Seafloor Rendering, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D”, and “E”

Plate 2 AUV Water Depth and Seafloor Features, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D”, and “E”

Plate 3 AUV Surface Gradient, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D”, and “E”

Plate 4 AUV Multibeam Backscatter, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D”, and “E”

Plate 5 AUV Side Scan Sonar Mosaic, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D”, and “E”

Plate 6 Sub-Surface Geologic Features Over Top of Salt, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D”, and “E”

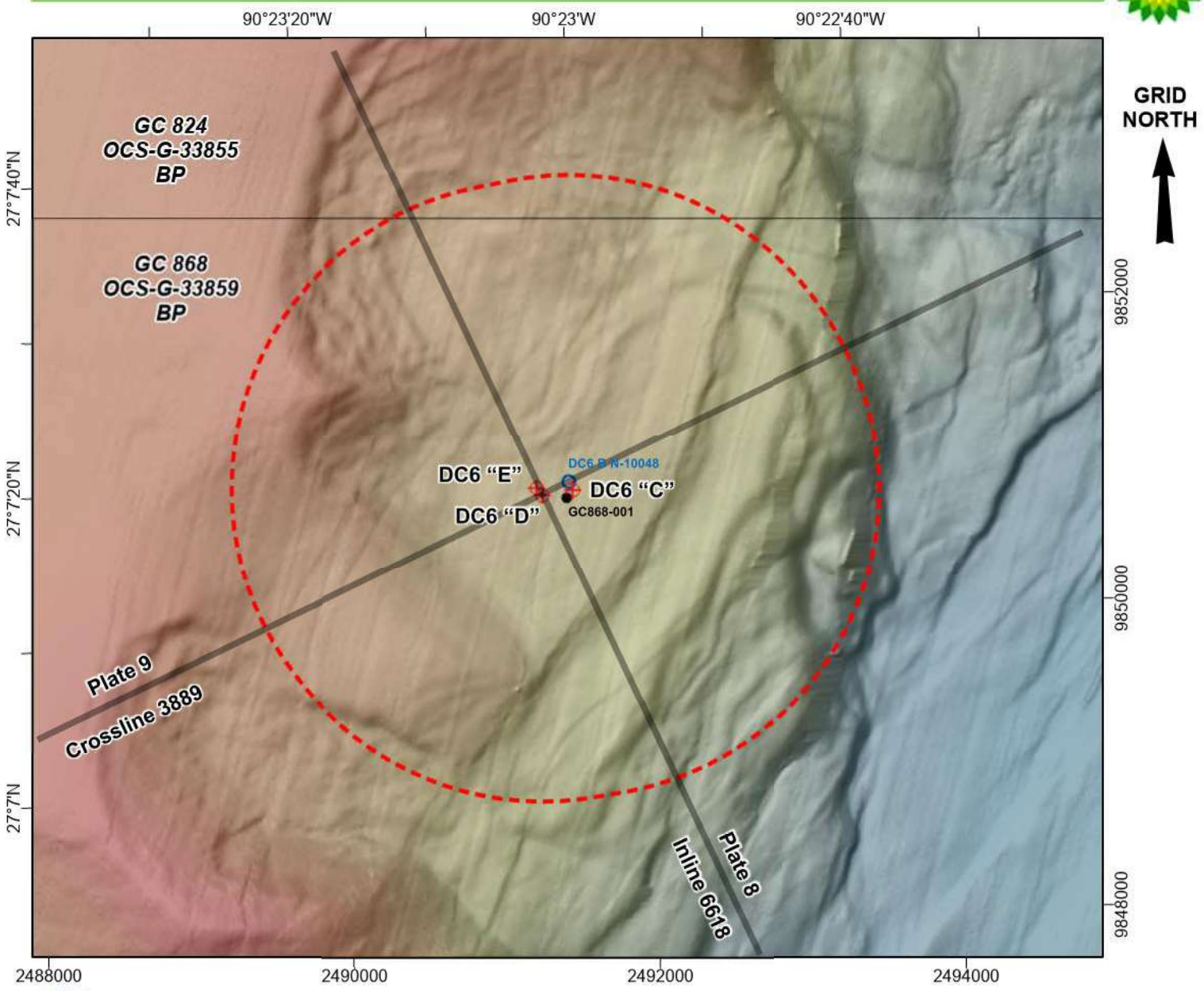
Plate 7 Portion of AUV Subbottom Line 178.1.a.0.et.subb.part-02, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D” and “E”

Plate 8 3D Seismic Section, Portion of Inline 6618, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D” and “E”

Plate 9 3D Seismic Section, Portion of Crossline 3889, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D”, and “E”

Plate 10 Top-hole Prognosis Chart, Mad Dog 2, Block 868, Green Canyon Area, Drill Center 6 “C”, “D”, and “E”

**BP AMERICA INC.**
**SITE CLEARANCE LETTER, PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"**
**GREEN CANYON, GULF OF MEXICO**




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

NAD 27 UTM Zone 15 N
US Survey Feet

SCALE: 1:12,000

0 500 1,000 1,500 2,000

Feet

Water Depth (ft MSL)

-4102

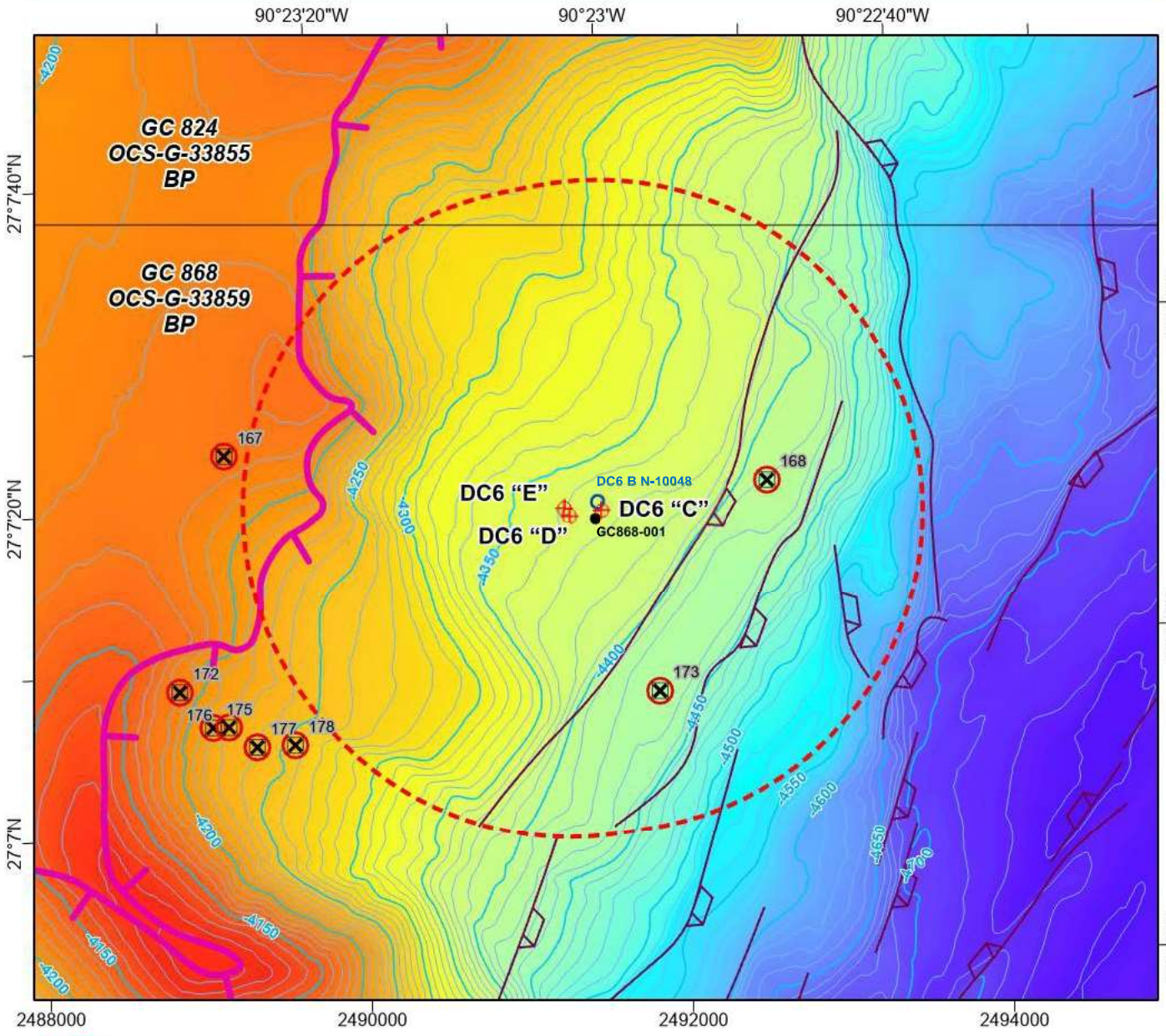
-4737

*MSL = Mean Sea Level*

Well Type

- Planned
- Permitted
- Drilled
- Lease Blocks

## AUV SEAFLOOR RENDERING
## MAD DOG 2, BLOCK 868, GREEN CANYON AREA
## PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"




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

NAD 27 UTM Zone 15 N
US Survey Feet

SCALE: 1:12,000

0 500 1,000 1,500 2,000

Feet

Well Type
- Planned
- Permitted
- Drilled
- Lease Blocks

- Sonar Contacts (with 100ft Buffer)
- Seafloor Faults
- Headscarps

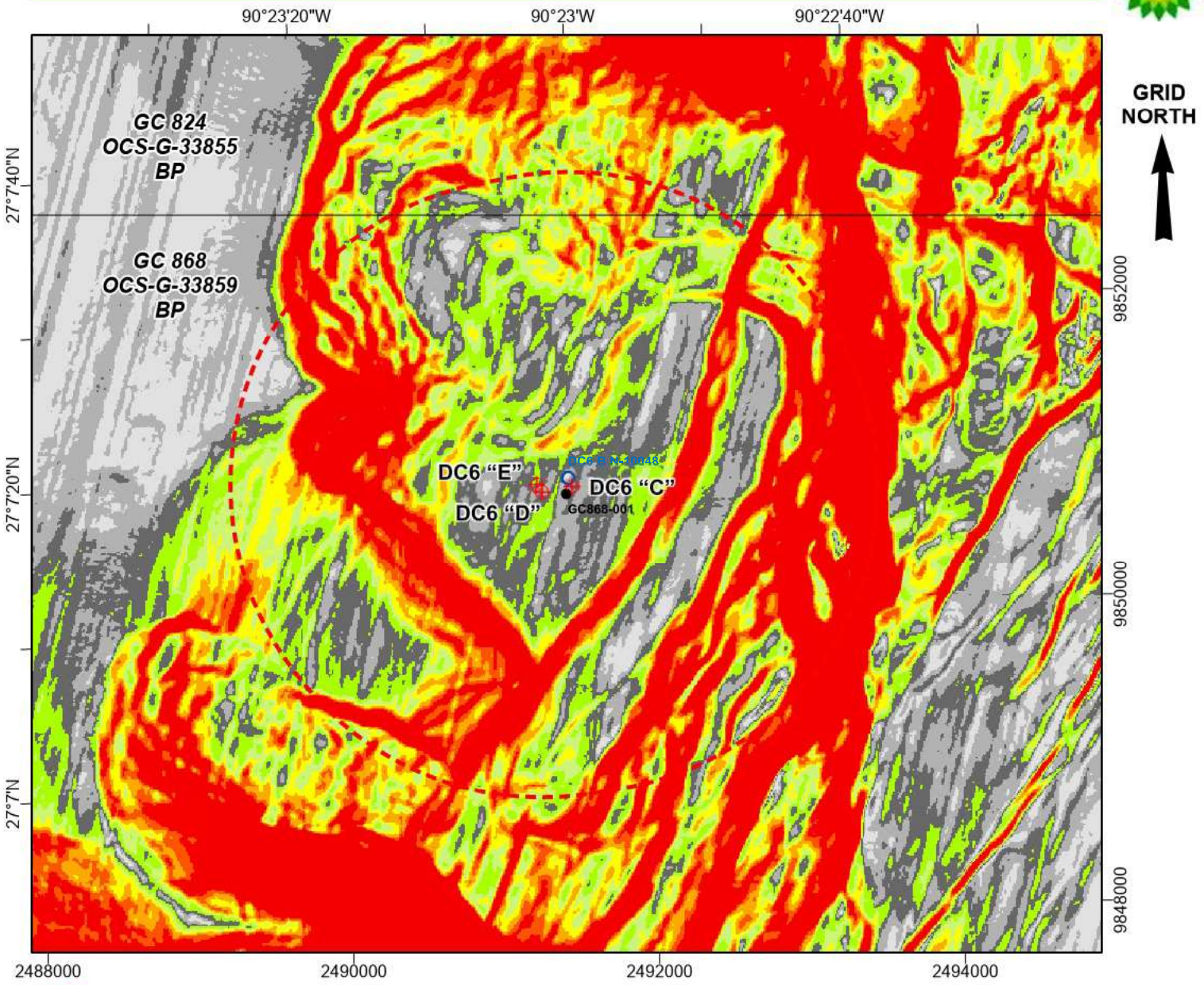
- Bathymetry Contours (50 ft Interval)
- Bathymetry Contours (10 ft Interval)

Water Depth (ft MSL)
-4102
-4737

*MSL = Mean Sea Level*

## AUV WATER DEPTH AND SEAFLOOR FEATURES
## MAD DOG 2, BLOCK 868, GREEN CANYON AREA
## PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"

**BP AMERICA INC.**
**SITE CLEARANCE LETTER, PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"**
**GREEN CANYON, GULF OF MEXICO**




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

NAD 27 UTM Zone 15 N
US Survey Feet

SCALE: 1:12,000

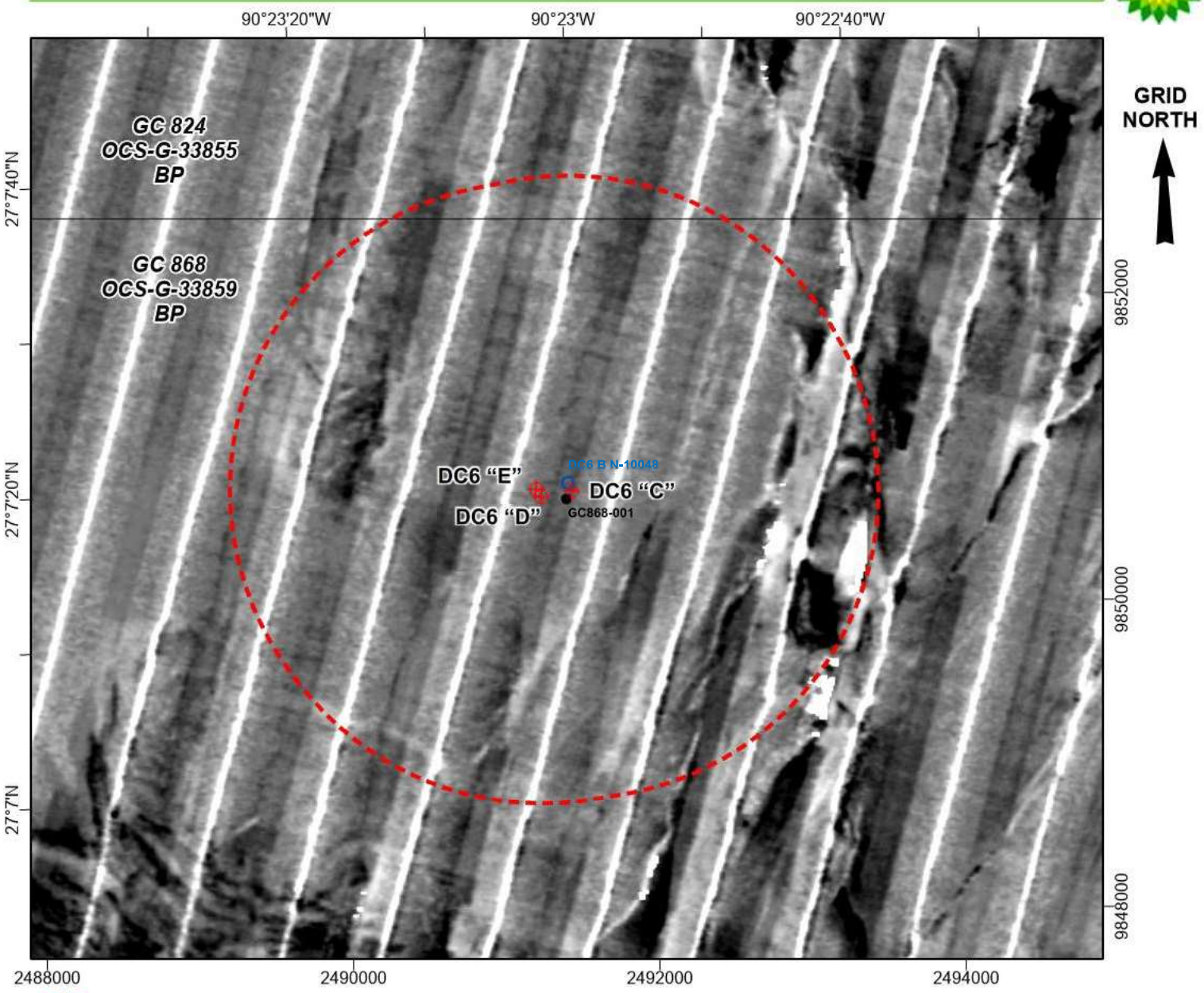
0 500 1,000 1,500 2,000

Feet

Well Type
- Planned
- Permitted
- Drilled
- Lease Blocks

Seafloor Slope (degrees)
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 90

## AUV SEAFLOOR GRADIENT
## MAD DOG 2, BLOCK 868, GREEN CANYON AREA
## PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"




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

NAD 27 UTM Zone 15 N
US Survey Feet

SCALE: 1:12,000

0 500 1,000 1,500 2,000

Feet

Relative Seafloor Backscatter Intensity

HIGH

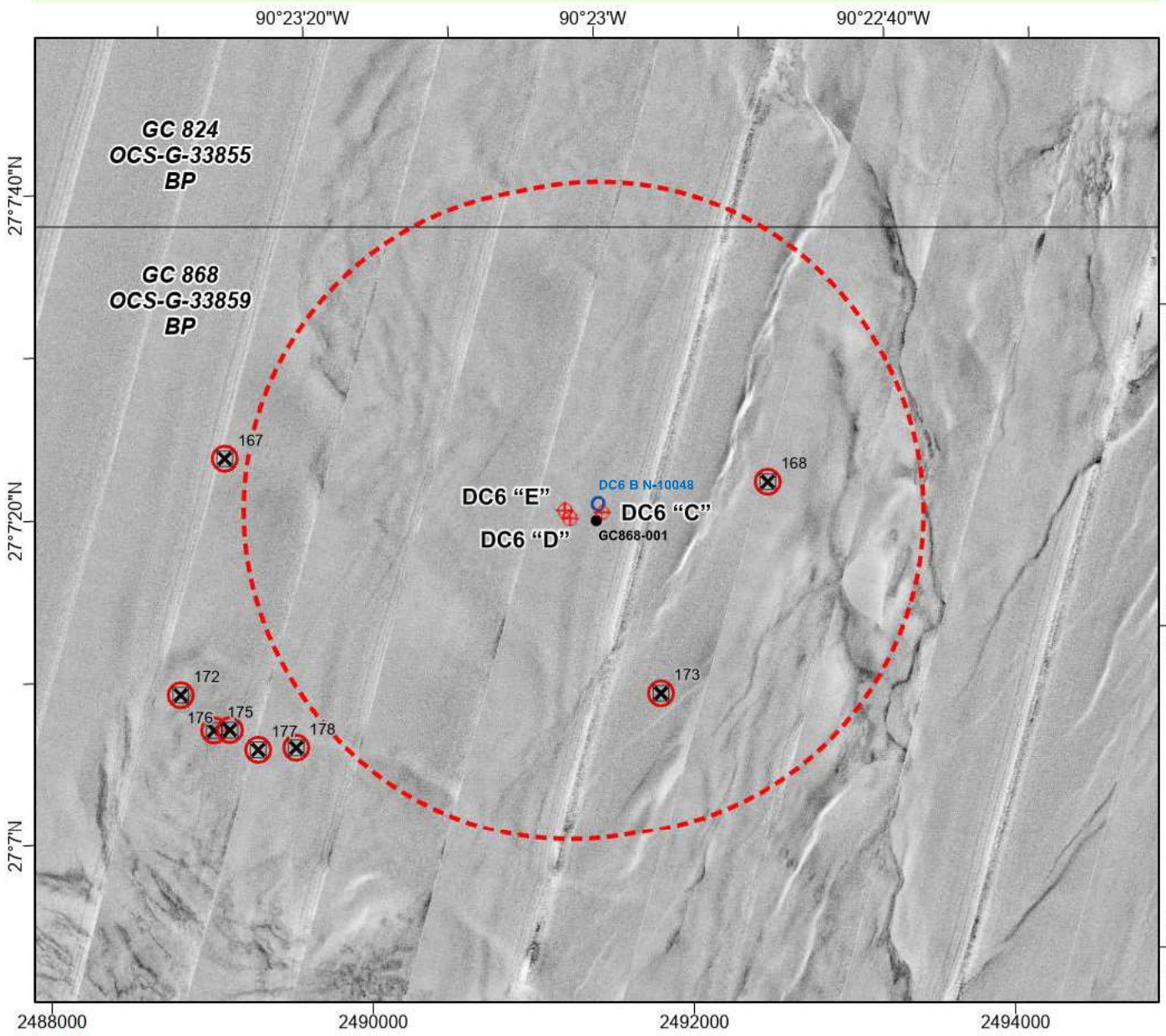
LOW

Well Type

- Planned
- Permitted
- Drilled
- Lease Blocks

# AUV MULTIBEAM BACKSCATTER
# MAD DOG 2, BLOCK 868, GREEN CANYON AREA
# PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"

**BP AMERICA INC.**
**SITE CLEARANCE LETTER, PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"**
**GREEN CANYON, GULF OF MEXICO**




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

NAD 27 UTM Zone 15 N
US Survey Feet

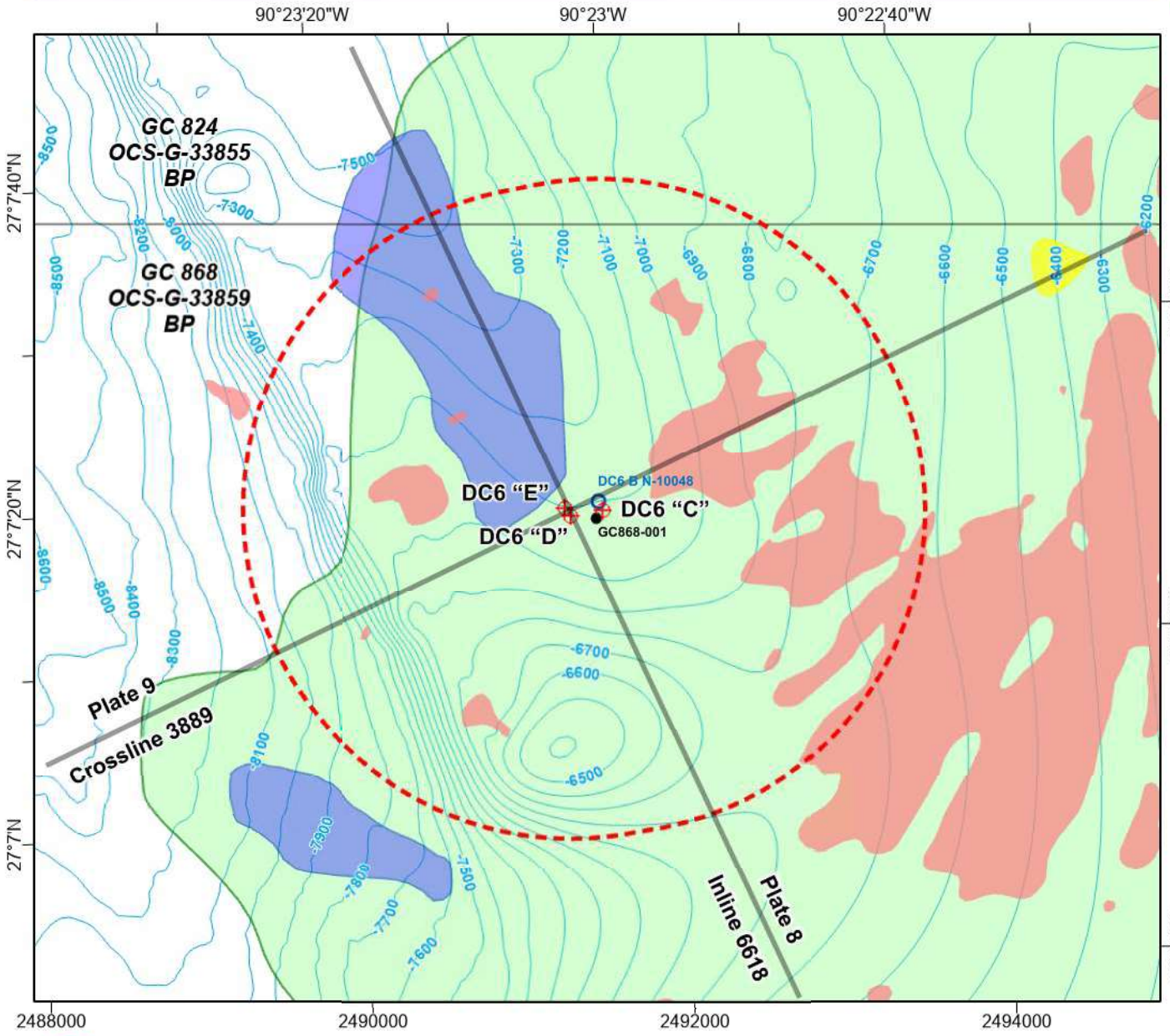
SCALE: 1:12,000

0 500 1,000 1,500 2,000
Feet

Side Scan Sonar Reflectivity
High
Low

Well Type
- Planned
- Permitted
- Drilled
- Lease Blocks
- Sonar Contacts (with 100ft Buffer)

**AUV SIDE SCAN SONAR MOSAIC**
**MAD DOG 2, BLOCK 868, GREEN CANYON AREA**
**PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"**




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

NAD 27 UTM Zone 15 N
US Survey Feet

SCALE: 1:12,000

0 500 1,000 1,500 2,000

Feet

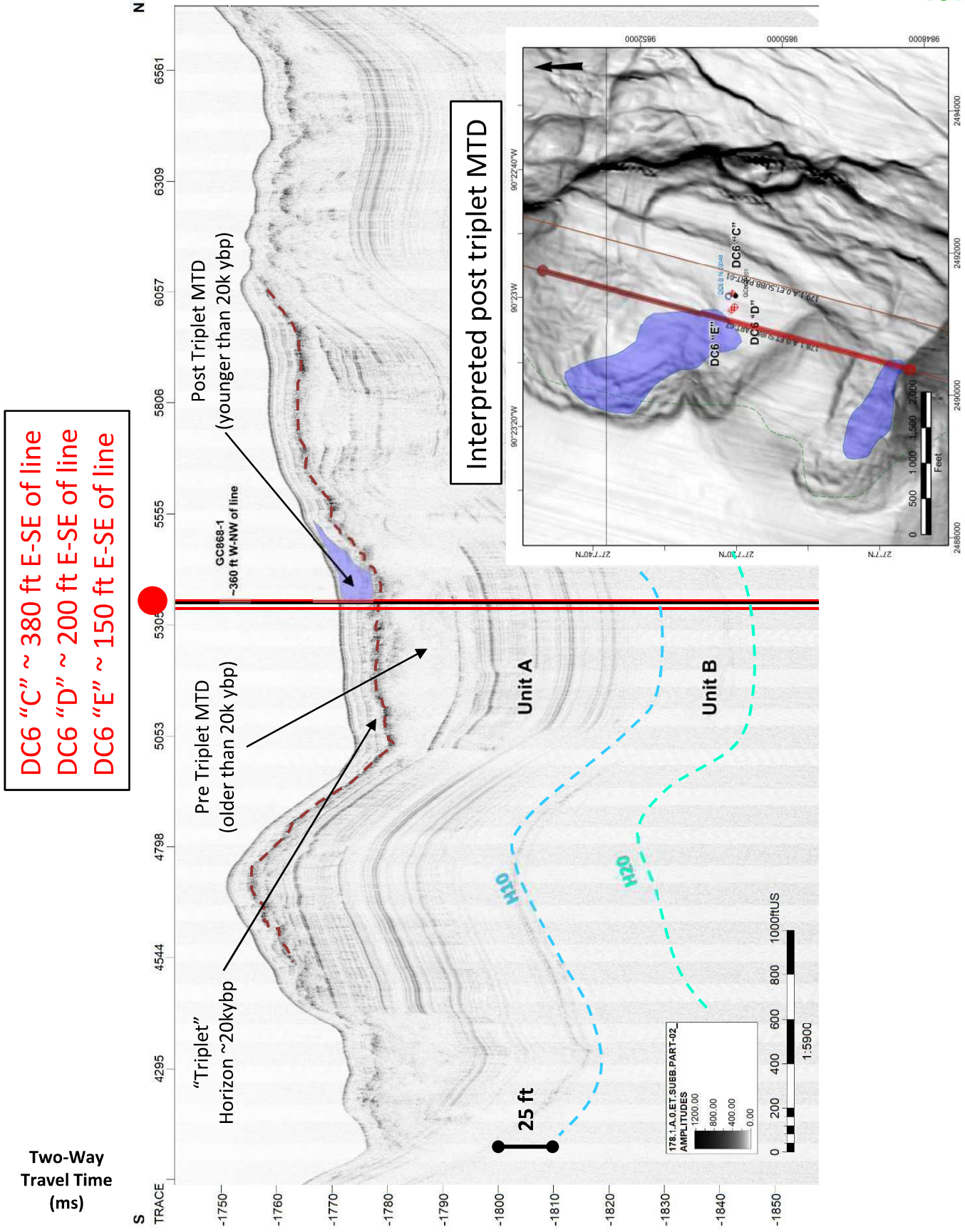
Well Type
- Planned
- Permitted
- Drilled
- Lease Blocks

- Amplitude Anomalies Unit F
- Amplitude Anomalies H90 and Top of Salt (Unit G)
- Post Triplet MTD
- Pre Triplet MTD

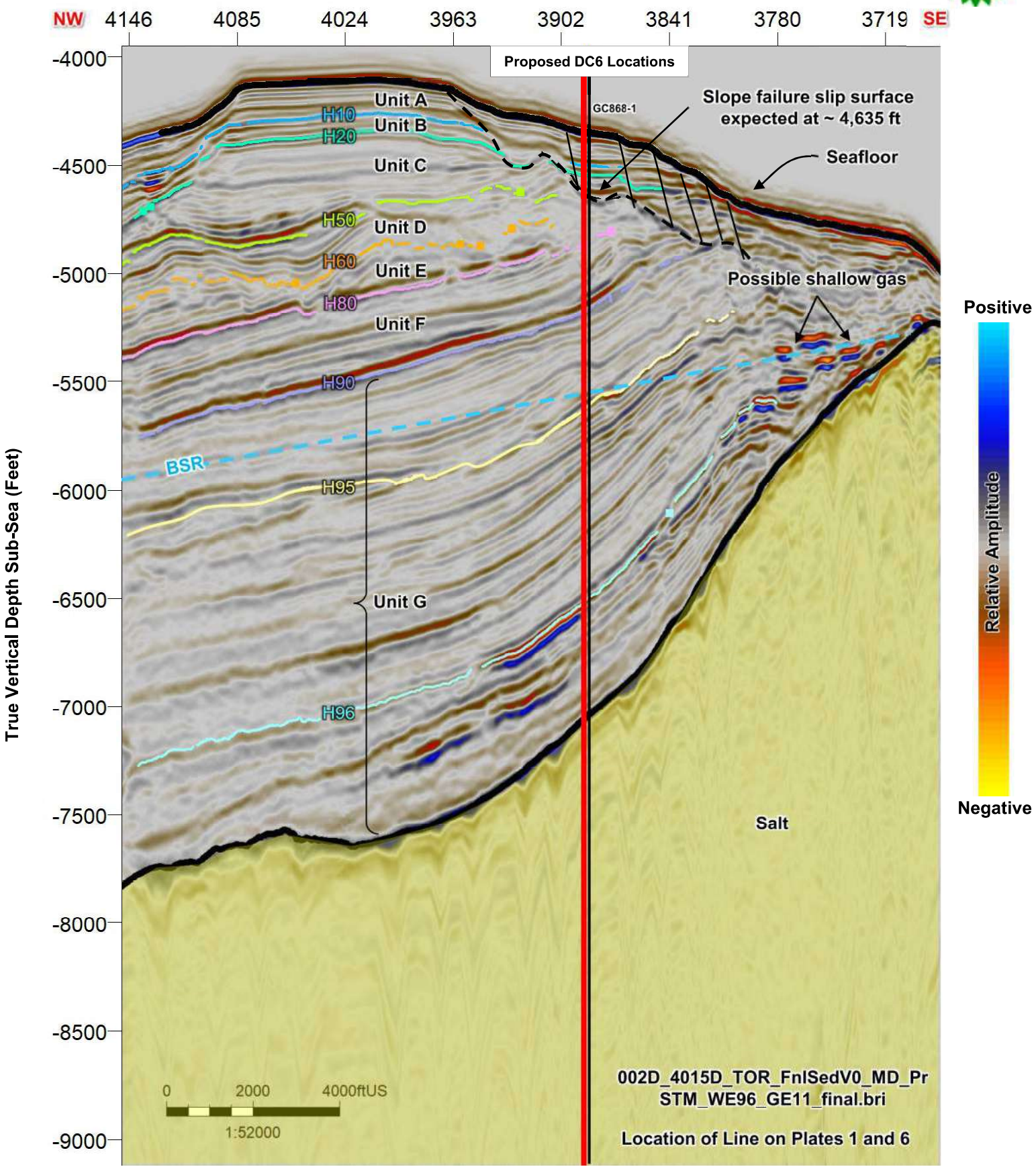
- Top of Salt Structure (Contour Interval 100ft)

*Based on GC868 #1 results, amplitudes are interpreted to represent lithology not shallow gas*

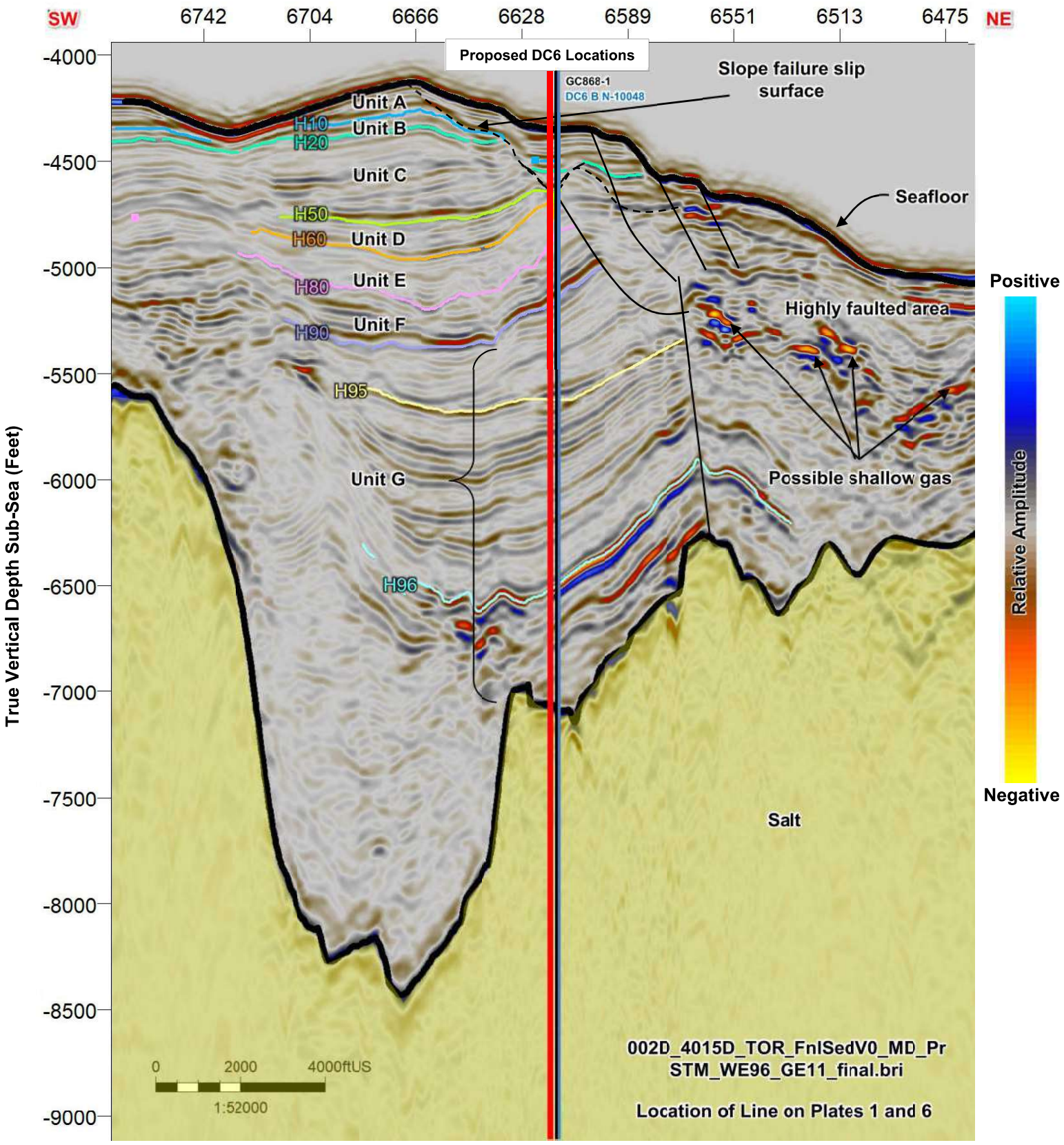
# SUB-SURFACE GEOLOGIC FEATURES OVER TOP OF SALT
# MAD DOG 2, BLOCK 868, GREEN CANYON AREA
# PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"




**PORTION OF AUV SUBBOTTOM LINE 178.1.a.0.et.subb.part-02,**
**MAD DOG 2, BLOCK 868, GREEN CANYON AREA**
**PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"**

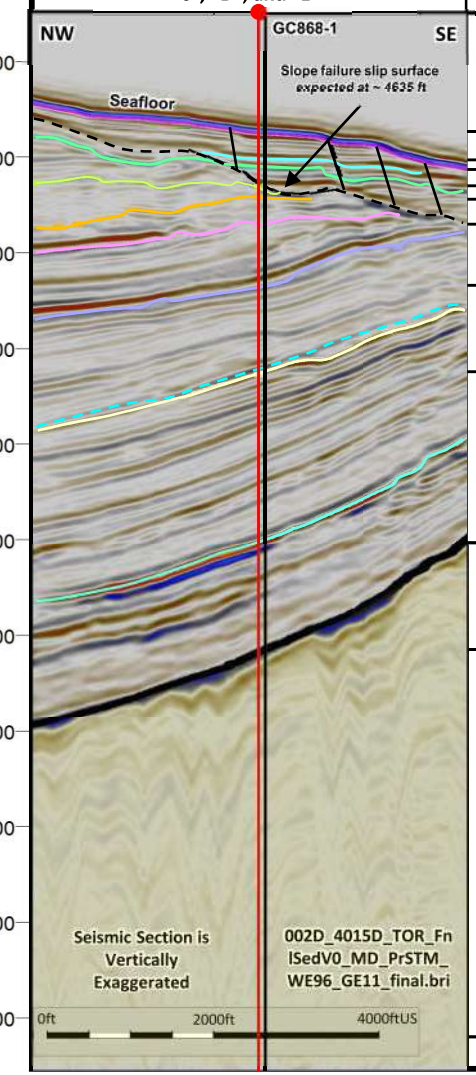



**3D SEISMIC SECTION, PORTION OF INLINE 6618,**
**MAD DOG 2, BLOCK 868, GREEN CANYON AREA**
**PROPOSED DRILL CENTER 6 GC 868 "C", "D", AND "E"**




**3D SEISMIC SECTION, PORTION OF CROSSLINE 3889,
MAD DOG 2, BLOCK 868, GREEN CANYON AREA
PROPOSED DRILL CENTER 6 GC 868 "C", "D" AND "E"**

BP AMERICA INC.
SITE CLEARANCE LETTER, PROPOSED DRILL CENTER 6 GC 868 "C", "D", and "E"
GREEN CANYON, GULF OF MEXICO




| Horizon & Unit | Inferred Lithology & Top-hole Conditions | BML (Feet) | TVDSS (Feet) | THICKNESS (Feet) | SHALLOW GAS POTENTIAL | SHALLOW OIL POTENTIAL | SHALLOW WATER FLOW POTENTIAL |
|---|---|---|---|---|---|---|---|
| | *Seafloor slopes ~1.7° to the south-southeast* | | | | | | |
| Seafloor (Unit A) | *Hemipelagic clays and silts with find grained MTD's.* | 0 | 4,362 | 153 | Negligible | Negligible | Negligible |
| Horizon 10 (Unit B) | *Clays and silts with inter-layered fine grained MTD's.* | 153 | 4,515 | 26 | Negligible | Negligible | Negligible |
| Horizon 20 (Unit C) | *Predominately fine-grained MTDs with possible inter-layered thin silt lenses. Slope failure slide surface expected at ~ 4635 ft. Possible increase in soil stiffness below slide surface.* | 179 | 4,541 | 147 | Negligible | Negligible | Negligible |
| Horizon 50 (Unit D) | *Predominately fine-grained MTDs with possible inter-layered thin silt lenses.* | 326 | 4,688 | 17 | Negligible | Negligible | Negligible |
| Horizon 60 (Unit E) | *Clays with inter-layered fine-grained MTDs.* | 343 | 4,705 | 130 | Negligible | Negligible | Negligible |
| Horizon 80 (Unit F) | *Clays with inter-layered fine-grained MTDs and possible thin interbedded sands near base of unit.* | 473 | 4,835 | 344 | Negligible | Negligible | Negligible / Low |
| Horizon 90 BGHS | *Inter-layered silt and clay with fine grained MTDs.* | 817 | 5,179 | 443 | Negligible | Negligible | Negligible |
| Horizon 95 | *Predicted base of gas hydrate stability* | 1,183 | 5,545 | | | | |
| Horizon 96 (Unit G) | *Inter-layered silt and clay with fine grained MTDs. Possible sand lenses in middle of unit.* | 1,260 | 5,622 | 938 | Negligible | Negligible | Low |
| Top of Salt | *Faulted clays with interbedded sands and silt.* | 2,198 | 6,560 | 569 | Negligible | Negligible | Low / Negligible |
| (Depth Limit of Investigation) | *No expected inclusions or anomalies within salt.* | 2,767 | 7129 | 1,990 | Negligible | Negligible | Negligible |
| | | 4,757 | 9,119 | | | | |

Uplifted, faulted unit with chaotic and well-layered reflectors composed of clays with occasional sand interbeds and lenses.

Risk Scale: Negligible | Low | Moderate | High

Unit and Horizon nomenclature follows the Gardline, 2012 Report.

Surface Locations at
"C": X = 2,491,430.95 ft , Y = 9,850,705.50 ft ;
"D": X = 2,491,233.36 ft , Y = 9,850,671.71 ft ;
"E": X = 2,491,194.98 ft , Y = 9,850,718.48 ft ;
UTM Zone 15 N (US ft) Geodetic Datum: NAD 1927

- *Note depths and horizons are relative to well location.*
- *MTD = Mass Transport Deposits*

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

# TOP-HOLE PROGNOSIS CHART,
# MAD DOG 2, BLOCK 868, GREEN CANYON AREA
# PROPOSED DRILL CENTER 6 GC 868 "C", "D", and "E"

Plate 10

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

# TABLE 1. OFFSHORE GOM DRILLING RELATED NPDES APPROVED WASTES DISCHARGED OVERBOARD

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

**Surface Block #** 868 **NOI-PF#** 2134 **Lat** 27° 07' 20.006 N **Long** 90° 23' 02.612 W

**Project Name:** AWSX8

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

All wells slotted to be drilled using Drilling Vessel - Stena IceMax

| 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 | 16,000 bbl/well | 7 days @ 2,286 bbl/day | Seafloor | No |
| Drill Cuttings wetted with Water Based Fluid | Water base interval | 2,700 bbl/well | 7 days @ 386 bbl/day | Seafloor | No |
| Excess Cement Slurry | Excess mixed cement, including additives & waste from equipment wash down after a cement operation | 150 bbl/well | 6 cmt jobs @ 25.00 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, | 4,700 bbl/well | 31 days @ 152 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. | 4,700 bbl/well | 31 days @ 152 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 | 95 bbl/well | 31 days @ 3 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 | 30,786 bbl/well | 145 days @ 30786 bbl/day | Surface | No |
| Sanitary Waste | Treated human body waste discharged from toilets & urinals | 4,101 bbl/well | 145 days @ 4101 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 @ 41457 bbl/day (avg) | Surface | No |
| **Will you conduct well treatment, completion, or workover?** | | | | | |
| Well Treatment Fluids | Stimulations fluids including acids, solvents & propping agents | 2 bbl/well | 145 events @ 0 bbl/event | Surface | No |
| Completion Fluids | Salt solutions, weighted brines, polymers & various additives | 2 bbl/well | 145 days @ 0 bbl/day | Surface | No |
| Proppants | volumes to be added to Completion fluids | 0 bbl/well | 145 days @ 0 bbl/day | Surface | No |
| Radioactive Tracers | volume or number of Tracers added to completion fluids | 2 bbl/well | 145 days @ 0 bbl/day | Surface | No |
| Workover Fluids - **If applicable** | Salt solutions, weighted brines, polymers, & other speciality additives | 2 bbl/well | 145 days @ 0 bbl/day | Surface | No |
| **Miscellaneous discharges. If yes, only fill in those associated with your activity.** | | | | | |
| Desalinization Unit Discharge | Wastewater associated with the process of creating freshwater from seawater | 7,223,436 bbl/well | 145 days @ 7223436 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 | 100 bbl/well | 80 events @ 1.25 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 @ 960,031 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 @ 11,006 bbl/day (avg) | Surface | N/A |
| Cement (including cement trace) discharged at seafloor | Excess mixed cement slurry generated during | 380 bbl/well | 2 event @ 190 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 | #VALUE! bbl/well | 145 days @ 158,429,277 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 bbl/well | 1 event @ 1 bbl/event | Surface | No |
| Sub Sea Fluid Discharges | Wellhead Preservation, Hydrate Control, Umbilical Steel Tube Storage, Leak Tracer, & Riser Tensioner Fluids | 100 bbl/well | 100 event @ 100 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 | 100 bbl/well | 50 event @ 50 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 | 1 event @ 1 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 | 11,006 bbl/well | 145 days @ 585,365 bbl/day | Surface | N/A |
| **BP General NPDES permit Number ?** | | **GMG290110** | | | |

# 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: | 115 | Asset Name: | Stena Ice Max |
|---|---|---|---|---|---|---|---|
| **Well Name: DC6-D-115 days** | **Projected generated waste** | | **Solid and Liquid Wastes transportation** | **Waste Disposal** | | | |
| **Type of Waste** | **Composition** | | **Transport Method** | **Name/Location of Facility** | **Quantity** | **Units** | **Disposal Method** |
| **Will drilling occur ? If yes, fill in the muds and cuttings.** | | | | | | | |
| Unused Synthetic-based drilling fluid | SBM from service - has not been downhole | | Liquid mud storage on workboat | Baroid / MI Swaco Fouchon LA | | | For Reclamation & re-use |
| Synthetic-based drilling mud solids and barite | SBM and barite from pit cleanout | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360 Fouchon, LA | 276 | 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 | | bbls/well | Landfill/ Deepwell injection on land |
| Used Synthetic base mud - from downhole | SBM from downhole - sent in to vendor for reuse | | Liquid mud storage on workboat | Baroid / MI Swaco Fouchon LA | | | For Reclamation & re-use |
| Drilling mud contaminated absorbents | Absorbent pads contaminated with drilling muds | | Barged in (Omega 2 yard boxes) | Omega Waste Management, Patterson, LA | | tons/well | Recycle |
| Excess barite | Excess barite from vessel tank cleaning | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | | tons/well | Reuse / Landfill |
| Excess cement | Excess cement from vessel tank cleaning | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | 9.2 | tons/well | Reuse / Landfill |
| Rig Drilling washwater | Cleaning out of mud tanks | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360, Fourchon LA | 1713.5 | bbls/well | Landfill/ Deepwell injection on land |
| Contaminated Completion Fluids | Used Completion fluids | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360 Fourchon LA | | bbls/well | Landfill/ Deepwell injection on land |
| Completion Fluids | Used Completion fluids | | Liquid storage tanks on workboat | Ecoserv / MI Swaco Fourchon LA | | bbls/well | Landfill/ Deepwell injection on land |
| **Will you produce hydrocarbons? If yes fill in for produced sand.** | | | | | | | |
| | | | | | | | |
| **Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.** | | | | | | | |
| Well Related Hazardous Waste | Rig lab titrations containing isopropanol alcohol, silver nitrate etc. | | Barged in (5 gallon DOT containers) | Chemical Waste Management, Sulphur, LA | 0.069 | 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 | 34.5 | ton/well | Incineration / Landfill |
| Rig Maintenance Wastes (non hazardous) | Oily rags, pads, oil filters etc. | | Barged in (totes) | Omega Waste Management, Patterson, LA | 16.1 | ton/well | Reuse / Landfill |
| Rig Used oil | Lube oil, hydraulic oil, glycol | | Barged in (drums) | Omega Waste Management, Patterson, LA | 6.9 | bbls/well | Recycle |
| Domestic waste | Municipal trash | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | 2.875 | ton/well | Incineration / Landfill |
| Scrap Metal | scrap piping, grating and other metals | | Barged in (scrap baskets) | Southern Scrap, Houma, LA | 26.45 | ton/well | Recycle |
| Universal Waste | Batteries | | Barged in (DOT drums) | LEI, Hammond, LA | 0.46 | ton/well | Recycle |
| Universal Waste | Fluorescent light bulbs | | Barged in (DOT drums) | LEI, Hammond, LA | 0.115 | ton/well | Recycle |
| Misc. unused chemical | Pills, spacers, additives etc. | | Barged in (totes) | River Birch Landfill, Avondale, LA | 391 | bbls/well | Recycle |
| Oily water | Washwater rig equipment | | Transported in (15 barrel cuttings boxes) | Omega Waste Management, Patterson, LA | 132.25 | bbls/well | Recycle |
| Recyclyed materials | Plastic, paper, aluminum | | Barged in (supersacks) | RTG/Hoover Ferguson, Iberia, LA | 3.45 | ton/well | Recycle |

# 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: | 115 | Asset Name: | Stena Ice Max |
|---|---|---|---|---|---|---|---|
| **Well Name: DC6-D** | **Projected generated waste** | | **Solid and Liquid Wastes transportation** | **Waste Disposal** | | | |
| **Type of Waste** | **Composition** | | **Transport Method** | **Name/Location of Facility** | **Quantity** | **Units** | **Disposal Method** |
| **Will drilling occur ? If yes, fill in the muds and cuttings.** | | | | | | | |
| Unused Synthetic-based drilling fluid | SBM from service - has not been downhole | | Liquid mud storage on workboat | Baroid / MI Swaco Fouchon LA | | | For Reclamation & re-use |
| Synthetic-based drilling mud solids and barite | SBM and barite from pit cleanout | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360 Fouchon, LA | 276 | 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 | | bbls/well | Landfill/ Deepwell injection on land |
| Used Synthetic base mud - from downhole | SBM from downhole - sent in to vendor for reuse | | Liquid mud storage on workboat | Baroid / MI Swaco Fouchon LA | | | For Reclamation & re-use |
| Drilling mud contaminated absorbents | Absorbent pads contaminated with drilling muds | | Barged in (Omega 2 yard boxes) | Omega Waste Management, Patterson, LA | | tons/well | Recycle |
| Excess barite | Excess barite from vessel tank cleaning | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | | tons/well | Reuse / Landfill |
| Excess cement | Excess cement from vessel tank cleaning | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | 9.2 | tons/well | Reuse / Landfill |
| Rig Drilling washwater | Cleaning out of mud tanks | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360, Fourchon LA | 1713.5 | bbls/well | Landfill/ Deepwell injection on land |
| Contaminated Completion Fluids | Used Completion fluids | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360 Fourchon LA | | bbls/well | Landfill/ Deepwell injection on land |
| Completion Fluids | Used Completion fluids | | Liquid storage tanks on workboat | Ecoserv / MI Swaco Fourchon LA | | bbls/well | Landfill/ Deepwell injection on land |
| **Will you produce hydrocarbons? If yes fill in for produced sand.** | | | | | | | |
| | | | | | | | |
| **Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.** | | | | | | | |
| Well Related Hazardous Waste | Rig lab titrations containing isopropanol alcohol, silver nitrate etc. | | Barged in (5 gallon DOT containers) | Chemical Waste Management, Sulphur, LA | 0.069 | 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 | 34.5 | ton/well | Incineration / Landfill |
| Rig Maintenance Wastes (non hazardous) | Oily rags, pads, oil filters etc. | | Barged in (totes) | Omega Waste Management, Patterson, LA | 16.1 | ton/well | Reuse / Landfill |
| Rig Used oil | Lube oil, hydraulic oil, glycol | | Barged in (drums) | Omega Waste Management, Patterson, LA | 6.9 | bbls/well | Recycle |
| Domestic waste | Municipal trash | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | 2.875 | ton/well | Incineration / Landfill |
| Scrap Metal | scrap piping, grating and other metals | | Barged in (scrap baskets) | Southern Scrap, Houma, LA | 26.45 | ton/well | Recycle |
| Universal Waste | Batteries | | Barged in (DOT drums) | LEI, Hammond, LA | 0.46 | ton/well | Recycle |
| Universal Waste | Fluorescent light bulbs | | Barged in (DOT drums) | LEI, Hammond, LA | 0.115 | ton/well | Recycle |
| Misc. unused chemical | Pills, spacers, additives etc. | | Barged in (totes) | River Birch Landfill, Avondale, LA | 391 | bbls/well | Recycle |
| Oily water | Washwater rig equipment | | Transported in (15 barrel cuttings boxes) | Omega Waste Management, Patterson, LA | 132.25 | bbls/well | Recycle |
| Recyclyed materials | Plastic, paper, aluminum | | Barged in (supersacks) | RTG/Hoover Ferguson, Iberia, LA | 3.45 | ton/well | Recycle |

# 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: | 115 | Asset Name: | Stena Ice Max |
|---|---|---|---|---|---|---|---|
| **Well Name: DC6-E** | **Projected generated waste** | | **Solid and Liquid Wastes transportation** | **Waste Disposal** | | | |
| **Type of Waste** | **Composition** | | **Transport Method** | **Name/Location of Facility** | **Quantity** | **Units** | **Disposal Method** |
| **Will drilling occur ? If yes, fill in the muds and cuttings.** | | | | | | | |
| Unused Synthetic-based drilling fluid | SBM from service - has not been downhole | | Liquid mud storage on workboat | Baroid / MI Swaco Fouchon LA | | | For Reclamation & re-use |
| Synthetic-based drilling mud solids and barite | SBM and barite from pit cleanout | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360 Fouchon, LA | 276 | 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 | | bbls/well | Landfill/ Deepwell injection on land |
| Used Synthetic base mud - from downhole | SBM from downhole - sent in to vendor for reuse | | Liquid mud storage on workboat | Baroid / MI Swaco Fouchon LA | | | For Reclamation & re-use |
| Drilling mud contaminated absorbents | Absorbent pads contaminated with drilling muds | | Barged in (Omega 2 yard boxes) | Omega Waste Management, Patterson, LA | | tons/well | Recycle |
| Excess barite | Excess barite from vessel tank cleaning | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | | tons/well | Reuse / Landfill |
| Excess cement | Excess cement from vessel tank cleaning | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | 9.2 | tons/well | Reuse / Landfill |
| Rig Drilling washwater | Cleaning out of mud tanks | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360, Fourchon LA | 1713.5 | bbls/well | Landfill/ Deepwell injection on land |
| Contaminated Completion Fluids | Used Completion fluids | | Barged in (15 or 25 barrel cutting boxes) | Ecoserv / R360 Fourchon LA | | bbls/well | Landfill/ Deepwell injection on land |
| Completion Fluids | Used Completion fluids | | Liquid storage tanks on workboat | Ecoserv / MI Swaco Fourchon LA | | bbls/well | Landfill/ Deepwell injection on land |
| **Will you produce hydrocarbons? If yes fill in for produced sand.** | | | | | | | |
| | | | | | | | |
| **Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.** | | | | | | | |
| Well Related Hazardous Waste | Rig lab titrations containing isopropanol alcohol, silver nitrate etc. | | Barged in (5 gallon DOT containers) | Chemical Waste Management, Sulphur, LA | 0.069 | 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 | 34.5 | ton/well | Incineration / Landfill |
| Rig Maintenance Wastes (non hazardous) | Oily rags, pads, oil filters etc. | | Barged in (totes) | Omega Waste Management, Patterson, LA | 16.1 | ton/well | Reuse / Landfill |
| Rig Used oil | Lube oil, hydraulic oil, glycol | | Barged in (drums) | Omega Waste Management, Patterson, LA | 6.9 | bbls/well | Recycle |
| Domestic waste | Municipal trash | | Barged in (supersacks) | River Birch Landfill, Avondale, LA | 2.875 | ton/well | Incineration / Landfill |
| Scrap Metal | scrap piping, grating and other metals | | Barged in (scrap baskets) | Southern Scrap, Houma, LA | 26.45 | ton/well | Recycle |
| Universal Waste | Batteries | | Barged in (DOT drums) | LEI, Hammond, LA | 0.46 | ton/well | Recycle |
| Universal Waste | Fluorescent light bulbs | | Barged in (DOT drums) | LEI, Hammond, LA | 0.115 | ton/well | Recycle |
| Misc. unused chemical | Pills, spacers, additives etc. | | Barged in (totes) | River Birch Landfill, Avondale, LA | 391 | bbls/well | Recycle |
| Oily water | Washwater rig equipment | | Transported in (15 barrel cuttings boxes) | Omega Waste Management, Patterson, LA | 132.25 | bbls/well | Recycle |
| Recyclyed materials | Plastic, paper, aluminum | | Barged in (supersacks) | RTG/Hoover Ferguson, Iberia, LA | 3.45 | ton/well | Recycle |

## Appendix E: Air Emissions Information – Form BOEM-0139

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

| | |
|---|---|
| **COMPANY** | BP Exploration & Production Inc. |
| **AREA** | Green Canyon |
| **BLOCK** | GC-868 |
| **LEASE** | OCS-G33859 |
| **FACILITY** | Argos |
| **WELL** | GC868 DC6 Wells "C", "D", "E" |
| **COMPANY CONTACT** | Ramesh Gopal (Air Quality Review)/Adalberto Garcia |
| **TELEPHONE NO.** | 346-744-5737 / 281-995-2815 |
| **REMARKS** | Supplemental DOCD for the addition of 3 new wells and associated subsea components. |

| **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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| Storage Tank | tons/yr/tank | | | | | | 4.300 | | | | 2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI) | 2017 |
| Fugitives | lbs/hr/component | | | | | | 0.0005 | | | | API Study | 12/93 |
| Glycol Dehydrator | tons/yr/dehydrator | | | | | | 19.240 | | | | 2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI) | 2014 |
| Cold Vent | tons/yr/vent | | | | | | 44.747 | | | | 2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI) | 2017 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |

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

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

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

# AIR EMISSIONS CALCULATIONS - 1ST YEAR

| COMPANY | AREA | | BLOCK | LEASE | FACILITY | WELL | | | | | CONTACT | PHONE | REMARKS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | | GC-868 | OCS-G33859 | Argos | GC868 DC6 Wells "C", "D", "E" | | | | | Ramesh Gopal (Air Quality Review | 346-744-5737 / 281-995-2815 | Supplemental DOCD for the addition of 3 new wells and associated subsea components. | | | | | | | | | | |
| 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 Ice Max** | **Average Daily Fuel Usage**<br>**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 | 150 | 43.59 | 26.30 | 25.51 | 0.63 | 1044.49 | 30.03 | 0.00 | 163.83 | 0.30 | 78.47 | 47.34 | 45.92 | 1.14 | 1880.07 | 54.06 | 0.01 | 294.89 | 0.55 |
| Small/Large Auxiliary Engines | VESSELS – Drilling Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 150 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 3.17 | 1.92 | 1.86 | 0.05 | 76.06 | 2.19 | 0.00 | 11.93 | 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 | | 18800 | 967.18 | 23212.44 | 24 | 0 | 13.26 | 8.00 | 7.76 | 0.19 | 317.77 | 9.14 | 0.00 | 49.84 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 5 x 910kW | VESSELS – Prime Engine, Auxiliary | | 6100 | 313.82 | 7531.69 | 24 | 0 | 4.30 | 2.60 | 2.52 | 0.06 | 103.11 | 2.96 | 0.00 | 16.17 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Egen: 1 x 250 kW | VESSELS – Prime Engine, Auxiliary | | 335 | 17.23 | 413.63 | 2 | 0 | 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 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 0 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Olympic Challenger** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Engines: 6 x Cat 3516C, 2188kW ea | VESSELS -Construction/Intervention - Diesel | | 17604 | 905.66 | 21735.73 | 24 | 43 | 12.42 | 7.49 | 7.27 | 0.18 | 297.56 | 8.56 | 0.00 | 46.67 | 0.09 | 6.41 | 3.87 | 3.75 | 0.09 | 153.54 | 4.41 | 0.00 | 24.08 | 0.04 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 43 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.91 | 0.55 | 0.53 | 0.01 | 21.80 | 0.63 | 0.00 | 3.42 | 0.01 |
| **Island Venture** | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea. | VESSELS -Construction/Intervention - Diesel | | 27170 | 1397.79 | 33546.91 | 24 | 10 | 19.17 | 11.56 | 11.22 | 0.28 | 459.25 | 13.20 | 0.00 | 72.03 | 0.13 | 2.30 | 1.39 | 1.35 | 0.03 | 55.11 | 1.58 | 0.00 | 8.64 | 0.02 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 10 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.21 | 0.13 | 0.12 | 0.00 | 5.07 | 0.15 | 0.00 | 0.80 | 0.00 |
| **Deep Blue** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Engines: 45,000 hp | VESSELS -Construction/Intervention - Diesel | | 45000 | 2315.07 | 55561.68 | 24 | 20 | 31.75 | 19.15 | 18.58 | 0.46 | 760.62 | 21.87 | 0.00 | 119.30 | 0.22 | 7.62 | 4.60 | 4.46 | 0.11 | 182.55 | 5.25 | 0.00 | 28.63 | 0.05 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 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 |
| **2024 Facility Total Emissions** | | | | | | | | **133.55** | **80.57** | **78.16** | **1.94** | **3,199.73** | **92.00** | **0.01** | **501.87** | **0.93** | **99.52** | **60.04** | **58.24** | **1.45** | **2,384.35** | **68.56** | **0.01** | **373.98** | **0.70** |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | | | | | | **4,462.20** | | | **4,462.20** | **4,462.20** | **4,462.20** | | **89,032.54** | |
| | 134.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **DRILLING - Offshore support Vessels** | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 150 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 9.14 | 5.52 | 5.35 | 0.13 | 219.06 | 6.30 | 0.00 | 34.36 | 0.06 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 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 | 370.4112 | 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 | 370.4112 | 8889.87 | 24 | 0 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 22 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 1.34 | 0.81 | 0.78 | 0.02 | 32.13 | 0.92 | 0.00 | 5.04 | 0.01 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 5 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 0.30 | 0.18 | 0.18 | 0.00 | 7.30 | 0.21 | 0.00 | 1.15 | 0.00 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 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 |
| **2024 Non-Facility Total Emissions** | | | | | | | | **35.56** | **21.45** | **20.81** | **0.52** | **851.90** | **24.49** | **0.00** | **133.62** | **0.25** | **16.27** | **9.82** | **9.52** | **0.24** | **389.93** | **11.21** | **0.00** | **61.16** | **0.11** |

# AIR EMISSIONS CALCULATIONS - 1ST YEAR

| COMPANY | AREA | | BLOCK | LEASE | FACILITY | WELL | | | | | CONTACT | PHONE | REMARKS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | | GC-868 | OCS-G33859 | Argos | GC868 DC6 Wells "C", "D", "E" | | | | | Ramesh Gopal (Air Quality Review | 346-744-5737 / 281-995-2815 | Supplemental DOCD for the addition of 3 new wells and associated subsea components. | | | | | | | | | | |
| 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**<br>**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 | 250 | 43.59 | 26.30 | 25.51 | 0.63 | 1044.49 | 30.03 | 0.00 | 163.83 | 0.30 | 130.78 | 78.90 | 76.54 | 1.90 | 3133.46 | 90.09 | 0.01 | 491.48 | 0.91 |
| Small/Large Auxiliary Engines | VESSELS – Drilling Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 250 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 5.29 | 3.19 | 3.10 | 0.08 | 126.77 | 3.64 | 0.00 | 19.88 | 0.04 |
| **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 | | 18800 | 967.18 | 23212.44 | 24 | 101 | 13.26 | 8.00 | 7.76 | 0.19 | 317.77 | 9.14 | 0.00 | 49.84 | 0.09 | 16.07 | 9.70 | 9.41 | 0.23 | 385.14 | 11.07 | 0.00 | 60.41 | 0.11 |
| Generators: 5 x 910kW | VESSELS – Prime Engine, Auxiliary | | 6100 | 313.82 | 7531.69 | 24 | 101 | 4.30 | 2.60 | 2.52 | 0.06 | 103.11 | 2.96 | 0.00 | 16.17 | 0.03 | 5.22 | 3.15 | 3.05 | 0.08 | 124.97 | 3.59 | 0.00 | 19.60 | 0.04 |
| Egen: 1 x 250 kW | VESSELS – Prime Engine, Auxiliary | | 335 | 17.23 | 413.63 | 2 | 15 | 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 | 0.08 | 0.00 | 0.00 | 0.01 | 0.00 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 101 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 2.14 | 1.29 | 1.25 | 0.03 | 51.22 | 1.47 | 0.00 | 8.03 | 0.01 |
| **Olympic Challenger** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Engines: 6 x Cat 3516C, 2188kW ea | VESSELS -Construction/Intervention - Diesel | | 17604 | 905.66 | 21735.73 | 24 | 43 | 12.42 | 7.49 | 7.27 | 0.18 | 297.56 | 8.56 | 0.00 | 46.67 | 0.09 | 6.41 | 3.87 | 3.75 | 0.09 | 153.54 | 4.41 | 0.00 | 24.08 | 0.04 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 43 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.91 | 0.55 | 0.53 | 0.01 | 21.80 | 0.63 | 0.00 | 3.42 | 0.01 |
| **Island Venture** | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea. | VESSELS -Construction/Intervention - Diesel | | 27170 | 1397.79 | 33546.91 | 24 | 10 | 19.17 | 11.56 | 11.22 | 0.28 | 459.25 | 13.20 | 0.00 | 72.03 | 0.13 | 2.30 | 1.39 | 1.35 | 0.03 | 55.11 | 1.58 | 0.00 | 8.64 | 0.02 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 10 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.21 | 0.13 | 0.12 | 0.00 | 5.07 | 0.15 | 0.00 | 0.80 | 0.00 |
| **Deep Blue** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Engines: 45,000 hp | VESSELS -Construction/Intervention - Diesel | | 45000 | 2315.07 | 55561.68 | 24 | 20 | 31.75 | 19.15 | 18.58 | 0.46 | 760.62 | 21.87 | 0.00 | 119.30 | 0.22 | 7.62 | 4.60 | 4.46 | 0.11 | 182.55 | 5.25 | 0.00 | 28.63 | 0.05 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 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 |
| **2025 Facility Total Emissions** | | | | | | | | **133.55** | **80.57** | **78.16** | **1.94** | **3,199.73** | **92.00** | **0.01** | **501.87** | **0.93** | **177.38** | **107.02** | **103.81** | **2.58** | **4,249.84** | **122.19** | **0.01** | **666.58** | **1.24** |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | | | | | | **4,462.20** | | | **4,462.20** | **4,462.20** | **4,462.20** | | **89,032.54** | |
| | 134.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **DRILLING - Offshore support Vessels** | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 250 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 15.24 | 9.19 | 8.92 | 0.22 | 365.10 | 10.50 | 0.00 | 57.26 | 0.11 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 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 | 370.4112 | 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 | 370.4112 | 8889.87 | 24 | 51 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 3.11 | 1.88 | 1.82 | 0.05 | 74.48 | 2.14 | 0.00 | 11.68 | 0.02 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 22 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 1.34 | 0.81 | 0.78 | 0.02 | 32.13 | 0.92 | 0.00 | 5.04 | 0.01 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 5 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 0.30 | 0.18 | 0.18 | 0.00 | 7.30 | 0.21 | 0.00 | 1.15 | 0.00 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 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 |
| **2025 Non-Facility Total Emissions** | | | | | | | | **35.56** | **21.45** | **20.81** | **0.52** | **851.90** | **24.49** | **0.00** | **133.62** | **0.25** | **25.48** | **15.37** | **14.91** | **0.37** | **610.44** | **17.55** | **0.00** | **95.75** | **0.18** |

# AIR EMISSIONS CALCULATIONS - 1ST YEAR

| COMPANY | AREA | | BLOCK | LEASE | FACILITY | WELL | | | | | CONTACT | PHONE | REMARKS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | | GC-868 | OCS-G33859 | Argos | GC868 DC6 Wells "C", "D", "E" | | | | | Ramesh Gopal (Air Quality Review | 346-744-5737 / 281-995-2815 | Supplemental DOCD for the addition of 3 new wells and associated subsea components. | | | | | | | | | |
| 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**<br>**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 | 250 | 43.59 | 26.30 | 25.51 | 0.63 | 1044.49 | 30.03 | 0.00 | 163.83 | 0.30 | 130.78 | 78.90 | 76.54 | 1.90 | 3133.46 | 90.09 | 0.01 | 491.48 | 0.91 |
| Small/Large Auxiliary Engines | VESSELS – Drilling Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 250 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 5.29 | 3.19 | 3.10 | 0.08 | 126.77 | 3.64 | 0.00 | 19.88 | 0.04 |
| **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 | | 18800 | 967.18 | 23212.44 | 24 | 101 | 13.26 | 8.00 | 7.76 | 0.19 | 317.77 | 9.14 | 0.00 | 49.84 | 0.09 | 16.07 | 9.70 | 9.41 | 0.23 | 385.14 | 11.07 | 0.00 | 60.41 | 0.11 |
| Generators: 5 x 910kW | VESSELS – Prime Engine, Auxiliary | | 6100 | 313.82 | 7531.69 | 24 | 101 | 4.30 | 2.60 | 2.52 | 0.06 | 103.11 | 2.96 | 0.00 | 16.17 | 0.03 | 5.22 | 3.15 | 3.05 | 0.08 | 124.97 | 3.59 | 0.00 | 19.60 | 0.04 |
| Egen: 1 x 250 kW | VESSELS – Prime Engine, Auxiliary | | 335 | 17.23 | 413.63 | 2 | 15 | 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 | 0.08 | 0.00 | 0.00 | 0.01 | 0.00 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 101 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 2.14 | 1.29 | 1.25 | 0.03 | 51.22 | 1.47 | 0.00 | 8.03 | 0.01 |
| **Olympic Challenger** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Engines: 6 x Cat 3516C, 2188kW ea | VESSELS -Construction/Intervention - Diesel | | 17604 | 905.66 | 21735.73 | 24 | 43 | 12.42 | 7.49 | 7.27 | 0.18 | 297.56 | 8.56 | 0.00 | 46.67 | 0.09 | 6.41 | 3.87 | 3.75 | 0.09 | 153.54 | 4.41 | 0.00 | 24.08 | 0.04 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 43 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.91 | 0.55 | 0.53 | 0.01 | 21.80 | 0.63 | 0.00 | 3.42 | 0.01 |
| **Island Venture** | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea. | VESSELS -Construction/Intervention - Diesel | | 27170 | 1397.79 | 33546.91 | 24 | 10 | 19.17 | 11.56 | 11.22 | 0.28 | 459.25 | 13.20 | 0.00 | 72.03 | 0.13 | 2.30 | 1.39 | 1.35 | 0.03 | 55.11 | 1.58 | 0.00 | 8.64 | 0.02 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 10 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.21 | 0.13 | 0.12 | 0.00 | 5.07 | 0.15 | 0.00 | 0.80 | 0.00 |
| **Deep Blue** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Engines: 45,000 hp | VESSELS -Construction/Intervention - Diesel | | 45000 | 2315.07 | 55561.68 | 24 | 20 | 31.75 | 19.15 | 18.58 | 0.46 | 760.62 | 21.87 | 0.00 | 119.30 | 0.22 | 7.62 | 4.60 | 4.46 | 0.11 | 182.55 | 5.25 | 0.00 | 28.63 | 0.05 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 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 |
| **2026 Facility Total Emissions** | | | | | | | | **133.55** | **80.57** | **78.16** | **1.94** | **3,199.73** | **92.00** | **0.01** | **501.87** | **0.93** | **177.38** | **107.02** | **103.81** | **2.58** | **4,249.84** | **122.19** | **0.01** | **666.58** | **1.24** |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | | | | | | **4,462.20** | | | **4,462.20** | **4,462.20** | **4,462.20** | | **89,032.54** | |
| | 134.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **DRILLING - Offshore support Vessels** | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 250 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 15.24 | 9.19 | 8.92 | 0.22 | 365.10 | 10.50 | 0.00 | 57.26 | 0.11 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 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 | 370.4112 | 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 | 370.4112 | 8889.87 | 24 | 51 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 3.11 | 1.88 | 1.82 | 0.05 | 74.48 | 2.14 | 0.00 | 11.68 | 0.02 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 22 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 1.34 | 0.81 | 0.78 | 0.02 | 32.13 | 0.92 | 0.00 | 5.04 | 0.01 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 5 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 0.30 | 0.18 | 0.18 | 0.00 | 7.30 | 0.21 | 0.00 | 1.15 | 0.00 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 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 |
| **2026 Non-Facility Total Emissions** | | | | | | | | **35.56** | **21.45** | **20.81** | **0.52** | **851.90** | **24.49** | **0.00** | **133.62** | **0.25** | **25.48** | **15.37** | **14.91** | **0.37** | **610.44** | **17.55** | **0.00** | **95.75** | **0.18** |

# AIR EMISSIONS CALCULATIONS - 1ST YEAR

| COMPANY | AREA | | BLOCK | LEASE | FACILITY | WELL | | | | | CONTACT | PHONE | REMARKS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | | GC-868 | OCS-G33859 | Argos | GC868 DC6 Wells "C", "D", "E" | | | | | Ramesh Gopal (Air Quality Review | 346-744-5737 / 281-995-2815 | Supplemental DOCD for the addition of 3 new wells and associated subsea components. | | | | | | | | | | |
| 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**<br>**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 | 150 | 43.59 | 26.30 | 25.51 | 0.63 | 1044.49 | 30.03 | 0.00 | 163.83 | 0.30 | 78.47 | 47.34 | 45.92 | 1.14 | 1880.07 | 54.06 | 0.01 | 294.89 | 0.55 |
| Small/Large Auxiliary Engines | VESSELS – Drilling Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 150 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 3.17 | 1.92 | 1.86 | 0.05 | 76.06 | 2.19 | 0.00 | 11.93 | 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 | | 18800 | 967.18 | 23212.44 | 24 | 51 | 13.26 | 8.00 | 7.76 | 0.19 | 317.77 | 9.14 | 0.00 | 49.84 | 0.09 | 8.12 | 4.90 | 4.75 | 0.12 | 194.48 | 5.59 | 0.00 | 30.50 | 0.06 |
| Generators: 5 x 910kW | VESSELS – Prime Engine, Auxiliary | | 6100 | 313.82 | 7531.69 | 24 | 51 | 4.30 | 2.60 | 2.52 | 0.06 | 103.11 | 2.96 | 0.00 | 16.17 | 0.03 | 2.63 | 1.59 | 1.54 | 0.04 | 63.10 | 1.81 | 0.00 | 9.90 | 0.02 |
| Egen: 1 x 250 kW | VESSELS – Prime Engine, Auxiliary | | 335 | 17.23 | 413.63 | 2 | 8 | 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 | 0.05 | 0.00 | 0.00 | 0.01 | 0.00 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 51 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 1.08 | 0.65 | 0.63 | 0.02 | 25.86 | 0.74 | 0.00 | 4.06 | 0.01 |
| **Olympic Challenger** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Engines: 6 x Cat 3516C, 2188kW ea | VESSELS -Construction/Intervention - Diesel | | 17604 | 905.66 | 21735.73 | 24 | 21 | 12.42 | 7.49 | 7.27 | 0.18 | 297.56 | 8.56 | 0.00 | 46.67 | 0.09 | 3.13 | 1.89 | 1.83 | 0.05 | 74.98 | 2.16 | 0.00 | 11.76 | 0.02 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 21 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.44 | 0.27 | 0.26 | 0.01 | 10.65 | 0.31 | 0.00 | 1.67 | 0.00 |
| **Island Venture** | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 x CAT C280-16, 3800kW ea. + 2 x CAT 280-8, 2530 kW ea. | VESSELS -Construction/Intervention - Diesel | | 27170 | 1397.79 | 33546.91 | 24 | 5 | 19.17 | 11.56 | 11.22 | 0.28 | 459.25 | 13.20 | 0.00 | 72.03 | 0.13 | 1.15 | 0.69 | 0.67 | 0.02 | 27.55 | 0.79 | 0.00 | 4.32 | 0.01 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 5 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.11 | 0.06 | 0.06 | 0.00 | 2.54 | 0.07 | 0.00 | 0.40 | 0.00 |
| **Deep Blue** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Engines: 45,000 hp | VESSELS -Construction/Intervention - Diesel | | 45000 | 2315.07 | 55561.68 | 24 | 10 | 31.75 | 19.15 | 18.58 | 0.46 | 760.62 | 21.87 | 0.00 | 119.30 | 0.22 | 3.81 | 2.30 | 2.23 | 0.06 | 91.27 | 2.62 | 0.00 | 14.32 | 0.03 |
| Temporary Large/ Small Auxiliary Engines | VESSELS – Prime Engine, Auxiliary | | 2500 | 128.62 | 3086.76 | 24 | 10 | 1.76 | 1.06 | 1.03 | 0.03 | 42.26 | 1.21 | 0.00 | 6.63 | 0.01 | 0.21 | 0.13 | 0.12 | 0.00 | 5.07 | 0.15 | 0.00 | 0.80 | 0.00 |
| **2027 Facility Total Emissions** | | | | | | | | **133.55** | **80.57** | **78.16** | **1.94** | **3,199.73** | **92.00** | **0.01** | **501.87** | **0.93** | **102.33** | **61.74** | **59.88** | **1.49** | **2,451.69** | **70.49** | **0.01** | **384.54** | **0.72** |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | | | | | | **4,462.20** | | | **4,462.20** | **4,462.20** | **4,462.20** | | **89,032.54** | |
| | 134.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **DRILLING - Offshore support Vessels** | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 150 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 9.14 | 5.52 | 5.35 | 0.13 | 219.06 | 6.30 | 0.00 | 34.36 | 0.06 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 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 | 370.4112 | 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 | 370.4112 | 8889.87 | 24 | 26 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 1.58 | 0.96 | 0.93 | 0.02 | 37.97 | 1.09 | 0.00 | 5.96 | 0.01 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 11 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 0.67 | 0.40 | 0.39 | 0.01 | 16.06 | 0.46 | 0.00 | 2.52 | 0.00 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 3 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 0.18 | 0.11 | 0.11 | 0.00 | 4.38 | 0.13 | 0.00 | 0.69 | 0.00 |
| | VESSELS - Supply Diesel | | 7200 | 370.4112 | 8889.87 | 24 | 5 | 5.08 | 3.06 | 2.97 | 0.07 | 121.70 | 3.50 | 0.00 | 19.09 | 0.04 | 0.30 | 0.18 | 0.18 | 0.00 | 7.30 | 0.21 | 0.00 | 1.15 | 0.00 |
| **2027 Non-Facility Total Emissions** | | | | | | | | **35.56** | **21.45** | **20.81** | **0.52** | **851.90** | **24.49** | **0.00** | **133.62** | **0.25** | **16.76** | **10.11** | **9.81** | **0.24** | **401.61** | **11.55** | **0.00** | **62.99** | **0.12** |

# AIR EMISSIONS CALCULATIONS

| COMPANY | AREA | BLOCK | LEASE | FACILITY | WELL |
|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | GC-868 | OCS-G33859 | Argos | GC868 DC6 Wells "C", "D", "E" |

| Year | Facility Emitted Substance | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | TSP | PM10 | PM2.5 | SOx | NOx | VOC | Pb | CO | NH3 |
| 2024 | 99.52 | 60.04 | 58.24 | 1.45 | 2384.35 | 68.56 | 0.01 | 373.98 | 0.70 |
| 2025 | 177.38 | 107.02 | 103.81 | 2.58 | 4249.84 | 122.19 | 0.01 | 666.58 | 1.24 |
| 2026 | 177.38 | 107.02 | 103.81 | 2.58 | 4249.84 | 122.19 | 0.01 | 666.58 | 1.24 |
| 2027 | 102.33 | 61.74 | 59.88 | 1.49 | 2451.69 | 70.49 | 0.01 | 384.54 | 0.72 |
| Allowable | 4462.20 | | | 4462.20 | 4462.20 | 4462.20 | | 89032.54 | |

## DOCD AIR QUALITY SCREENING CHECKLIST

OMB Control No. 1010-0151
OMB Approval Expires: 06/30/2021

| | |
|---|---|
| **COMPANY** | BP Exploration & Production Inc. |
| **AREA** | Green Canyon |
| **BLOCK** | 780, 781, 824, 825, 826, 868, 869, 870 |
| **LEASE** | OCS-G 30300, 15609, 33855, 09981, 09982, 33859, 28100, 36056 |
| **PLATFORM** | ARGOS (Mad Dog 2 Project) |
| **WELL** | DC 1: Wells A,B,C,D,F,G,H,I, **New J**<br>DC 2: Wells A,B,C,D,E,F,G,H, **New I**<br>**DC 3: Wells A & B**<br>DC 4: Wells A,B,C,D,E,F,G, **New H & I**<br>DC 5: Wells, A, B & C<br>DC 6: Wells **A & B (new)** |
| **COMPANY CONTACT** | Donna Gyles (Air Quality Review)/ Linda Onstott ( Plans) |
| **TELEPHONE NO.** | Donna Gyles (281-832-4985)/ Linda Onstott (713-208-6176) |
| **REMARKS** | Adding 6 wells to Mad Dog 2 Project ARGOS FPU approved N-9830. Provisions for continued drilling, completion, construction and maintenance for Argos wells. |

**LEASE TERM PIPELINE CONSTRUCTION INFORMATION:**

| YEAR | NUMBER OF PIPELINES | TOTAL NUMBER OF CONSTRUCTION DAYS |
|---|---|---|
| 2018 | | |
| 2019 | | |
| 2020 | 10 | 198 |
| 2021 | 22 | 217 |
| 2022 | 5 | 25 |
| 2023 | 5 | 25 |
| 2024 | 4 | 20 |
| 2025 | 4 | 25 |
| 2026 | 4 | 25 |
| 2027 | 4 | 25 |
| 2028 | 4 | 25 |


Confidential

## AIR EMISSIONS CUMPUTATION FACTORS

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

| Equipment/Emission Factors | units | PM | SOx | NOx | VOC | CO | REF. | DATE |
|---|---|---|---|---|---|---|---|---|
| NG Turbines | gms/hp-hr | | 0.00247 | 1.3 | 0.01 | 0.83 | AP42 3.2-1& 3.1-1 | 10/96 |
| NG 2-cycle lean | gms/hp-hr | | 0.00185 | 10.9 | 0.43 | 1.5 | AP42 3.2-1 | 10/96 |
| NG 4-cycle lean | gms/hp-hr | | 0.00185 | 11.8 | 0.72 | 1.6 | AP42 3.2-1 | 10/96 |
| NG 4-cycle rich | gms/hp-hr | | 0.00185 | 10 | 0.14 | 8.6 | AP42 3.2-1 | 10/96 |
| | | | | | | | | |
| Diesel Recip. < 600 hp. | gms/hp-hr | 1 | 0.1835 | 14 | 1.12 | 3.03 | AP42 3.3-1 | 10/96 |
| Diesel Recip. > 600 hp. | gms/hp-hr | 0.32 | 0.1835 | 11 | 0.33 | 2.4 | AP42 3.4-1 | 10/96 |
| Diesel Boiler | lbs/bbl | 0.084 | 0.3025 | 0.84 | 0.008 | 0.21 | AP42 1.3-12,14 | 9/98 |
| | | | | | | | | |
| NG Heaters/Boilers/Burners | lbs/mmscf | 7.6 | 0.593 | 100 | 5.5 | 84 | P42 1.4-1, 14-2, & 14 | 7/98 |
| NG Flares | lbs/mmscf | | 0.593 | 71.4 | 60.3 | 388.5 | AP42 11.5-1 | 9/91 |
| Liquid Flaring | lbs/bbl | 0.42 | 6.83 | 2 | 0.01 | 0.21 | AP42 1.3-1 & 1.3-3 | 9/98 |
| Tank Vapors | lbs/bbl | | | | 0.03 | | E&P Forum | 1/93 |
| Fugitives | lbs/hr/comp. | | | | 0.0005 | | API Study | 12/93 |
| Glycol Dehydrator Vent | lbs/mmscf | | | | 6.6 | | La. DEQ | 1991 |
| Gas Venting | lbs/scf | | | | 0.0034 | | | |

| Sulphur Content Source | Value | Units |
|---|---|---|
| Fuel Gas | 3.33 | ppm |
| Diesel Fuel | 0.05 | % weight |
| Produced Gas( Flares) | 3.33 | ppm |
| Produced Oil (Liquid Flaring) | 1 | % weight |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | | Donna Gyles (28 | #REF! | | | | | | | | | | |
| **OPERATIONS** | **EQUIPMENT** | **RATING** | **MAX. FUEL** | **ACT. FUEL** | **RUN TIME** | | **MAXIMUM POUNDS PER HOUR** | | | | | **ESTIMATED TONS** | | | | |
| | **Diesel Engines** | **HP** | **GAL/HR** | **GAL/D** | | | | | | | | | | | | |
| **2018** | **Nat. Gas Engines** | **HP** | **SCF/HR** | **SCF/D** | | | | | | | | | | | | |
| | **Burners** | **MMBTU/HR** | **SCF/HR** | **SCF/D** | **HR/D** | **D/YR** | **PM** | **SOx** | **NOx** | **VOC** | **CO** | **PM** | **SOx** | **NOx** | **VOC** | **CO** |
| **DRILLING: West Auriga** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 100 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 26.48 | 15.18 | 577.52 | 27.31 | 198.58 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 100 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 6.61 | 1.21 | 92.51 | 7.40 | 20.02 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 100 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 6.09 | 3.49 | 209.34 | 6.28 | 45.67 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Dive Support Vessel** - Horsepower same or less | | | | | | | | | | | | | | | | |
| than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 | | | | | | | | | | | | | | | | |
| x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 0 | | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| | FLARE- Upset | | 0 | | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| | PROCESS VENT- | | 0 | | 0 | 0 | | | | 0.00 | | | | | 0.00 | |
| | FUGITIVES- | | | 0.0 | | 0 | | | | 0.00 | | | | | 0.00 | |
| | GLYCOL STILL VENT- Flare | | 0 | | 0 | 0 | | | | 0.00 | | | | | 0.00 | |
| | GLYCOL STILL VENT- VRU controlled | | 0 | | 0 | 0 | | | | 0.00 | | | | | 0.00 | |
| **2018** | **YEAR TOTAL** | | | | | | **68.24** | **36.99** | **1655.74** | **70.86** | **487.21** | **44.13** | **22.73** | **1049.55** | **46.09** | **301.41** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | Donna Gyles (28 | #REF! | |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2019 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga (Substitution likely by other Drillship/DP Semi-Submersible of similar of lower horsepower)** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn (Substitution likely by other Drillship/DP Semi-Submersible of similar of lower horsepower)** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 54280 | 2621.724 | 28319.00 | 24 | 61 | 38.26 | 21.94 | 1029.23 | 39.45 | 286.94 | 12.60 | 7.23 | 339.08 | 13.00 | 94.53 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 2180 | 105.294 | 2527.06 | 2 | 9 | 1.54 | 0.88 | 52.82 | 1.58 | 11.52 | 0.01 | 0.01 | 0.48 | 0.01 | 0.10 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 61 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 4.03 | 0.74 | 56.43 | 4.51 | 12.21 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 61 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 3.71 | 2.13 | 127.70 | 3.83 | 27.86 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Dive Support Vessel** - Horsepower same or less than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT C280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 0 | 0 | 0.00 | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 0 | | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| | FLARE- Upset | | 0 | | 0 | 0 | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| | PROCESS VENT- | | 0 | | 0 | 0 | | | | 0.00 | | | | | 0.00 | |
| | FUGITIVES- | | | 0.0 | | 0 | | | | 0.00 | | | | | 0.00 | |
| | GLYCOL STILL VENT- Flare | | 0 | | 0 | 0 | | | | 0.00 | | | | | 0.00 | |
| | GLYCOL STILL VENT- VRU controlled | | 0 | | 0 | 0 | | | | 0.00 | | | | | 0.00 | |
| 2019 | **YEAR TOTAL** | | | | | | **128.77** | **69.55** | **3338.23** | **133.77** | **916.54** | **173.18** | **88.33** | **4071.05** | **181.09** | **1173.00** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | Donna Gyles (28 | #REF! | |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2020 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga (Substitution likely by other Drillship/DP Semi-Submersible of similar of lower horsepower)** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn (Substitution likely by other Drillship/DP Semi-Submersible of similar of lower horsepower)** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 54280 | 2621.724 | 28319.00 | 24 | 153 | 38.26 | 21.94 | 1029.23 | 39.45 | 286.94 | 31.61 | 18.13 | 850.48 | 32.60 | 237.11 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 2180 | 105.294 | 2527.06 | 2 | 22 | 1.54 | 0.88 | 52.82 | 1.58 | 11.52 | 0.03 | 0.02 | 1.16 | 0.03 | 0.25 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 153 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 10.11 | 1.86 | 141.54 | 11.32 | 30.63 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 153 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 9.32 | 5.34 | 320.29 | 9.61 | 69.88 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 21255 | 1026.6165 | 24638.80 | 24 | 75 | 14.98 | 8.59 | 397.99 | 15.45 | 112.36 | 13.48 | 7.73 | 358.19 | 13.90 | 101.13 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 27035 | 1305.7905 | 31338.97 | 24 | 75 | 19.06 | 10.93 | 655.03 | 19.65 | 142.92 | 17.15 | 9.83 | 589.53 | 17.69 | 128.62 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 38 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.31 | 1.33 | 79.55 | 2.39 | 17.36 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 37500 | 1811.25 | 43470.00 | 24 | 17 | 26.43 | 15.16 | 908.59 | 27.26 | 198.24 | 5.39 | 3.09 | 185.35 | 5.56 | 40.44 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 2346 | 113.3118 | 2719.48 | 24 | 17 | 5.17 | 0.95 | 72.34 | 5.79 | 15.66 | 1.05 | 0.19 | 14.76 | 1.18 | 3.19 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 12500 | 603.75 | 14490.00 | 24 | 16 | 8.81 | 5.05 | 302.86 | 9.09 | 66.08 | 1.69 | 0.97 | 58.15 | 1.74 | 12.69 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 782 | 37.7706 | 906.49 | 24 | 16 | 1.72 | 0.32 | 24.11 | 1.93 | 5.22 | 0.33 | 0.06 | 4.63 | 0.37 | 1.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 30897 | 1492.3251 | 6604.00 | 24 | 48 | 21.78 | 12.49 | 748.61 | 22.46 | 163.33 | 2.31 | 1.33 | 79.51 | 2.39 | 17.35 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Dive Support Vessel** - Horsepower same or less than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 24 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 1.46 | 0.84 | 50.24 | 1.51 | 10.96 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 27170 | 1312.311 | 31495.46 | 24 | 64 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 14.71 | 8.43 | 321.73 | 15.17 | 110.31 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 122 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 1.87 | 0.34 | 5.58 | 2.09 | 5.67 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 122 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 1.87 | 0.34 | 5.58 | 2.09 | 5.67 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 122 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 8.06 | 1.48 | 112.86 | 9.03 | 24.43 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 1 | 52 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 0.06 | 0.03 | 2.00 | 0.06 | 0.44 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 1 | 52 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 0.06 | 0.03 | 2.00 | 0.06 | 0.44 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 61 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 3.71 | 2.13 | 127.70 | 3.83 | 27.86 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 122 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.25 | 134.15 | 1.03 | 85.65 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 122 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.25 | 134.15 | 1.03 | 85.65 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 122 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.25 | 134.15 | 1.03 | 85.65 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 122 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.16 | 86.01 | 0.66 | 54.92 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 122 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.16 | 86.01 | 0.66 | 54.92 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 122 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.09 | 0.07 | 0.47 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 122 | | | | 12.21 | | | | | 17.87 | |
| | FUGITIVES- | | | 15000.0 | | 122 | | | | 7.50 | | | | | 10.98 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.39 | | | | | 0.09 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 102 | | | | 0.39 | | | | | 0.48 | |
| 2020 | **YEAR TOTAL** | | | | | | **346.50** | **195.69** | **11313.72** | **1061.63** | **7100.76** | **320.15** | **170.19** | **9314.54** | **775.31** | **5178.75** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | | Donna Gyles (28 | #REF! |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2021 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 151 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 39.98 | 22.93 | 872.06 | 41.23 | 299.86 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 151 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 9.98 | 1.83 | 139.69 | 11.18 | 30.23 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 151 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 9.20 | 5.27 | 316.10 | 9.48 | 68.97 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 54280 | 2621.724 | 28319.00 | 24 | 365 | 38.26 | 21.94 | 1029.23 | 39.45 | 286.94 | 75.42 | 43.25 | 2028.92 | 77.78 | 565.65 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 2180 | 105.294 | 2527.06 | 2 | 52 | 1.54 | 0.88 | 52.82 | 1.58 | 11.52 | 0.08 | 0.05 | 2.75 | 0.08 | 0.60 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 21255 | 1026.6165 | 24638.80 | 24 | 14 | 14.98 | 8.59 | 397.99 | 15.45 | 112.36 | 2.52 | 1.44 | 66.86 | 2.60 | 18.88 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 27035 | 1305.7905 | 31338.97 | 24 | 14 | 19.06 | 10.93 | 655.03 | 19.65 | 142.92 | 3.20 | 1.84 | 110.05 | 3.30 | 24.01 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 7 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.43 | 0.24 | 14.65 | 0.44 | 3.20 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 37500 | 1811.25 | 43470.00 | 24 | 17 | 26.43 | 15.16 | 908.59 | 27.26 | 198.24 | 5.39 | 3.09 | 185.35 | 5.56 | 40.44 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 2346 | 113.3118 | 2719.48 | 24 | 17 | 5.17 | 0.95 | 72.34 | 5.79 | 15.66 | 1.05 | 0.19 | 14.76 | 1.18 | 3.19 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 12500 | 603.75 | 14490.00 | 24 | 17 | 8.81 | 5.05 | 302.86 | 9.09 | 66.08 | 1.80 | 1.03 | 61.78 | 1.85 | 13.48 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 782 | 37.7706 | 906.49 | 24 | 17 | 1.72 | 0.32 | 24.11 | 1.93 | 5.22 | 0.35 | 0.06 | 4.92 | 0.39 | 1.06 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 36216 | 1749.2328 | 41981.59 | 24 | 30 | 25.53 | 14.64 | 877.48 | 26.32 | 191.45 | 9.19 | 5.27 | 315.89 | 9.48 | 68.92 |
| **Dive Support Vessel** - Horsepower same or less | | | | | | | | | | | | | | | | |
| than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 15448 | 746.1384 | 17907.32 | 24 | 25 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 3.27 | 1.87 | 112.29 | 3.37 | 24.50 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 15448 | 746.1384 | 15566.00 | 24 | 41 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 4.66 | 2.67 | 160.07 | 4.80 | 34.93 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 15 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.91 | 0.52 | 31.40 | 0.94 | 6.85 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 21 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 1.28 | 0.73 | 43.96 | 1.32 | 9.59 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 27170 | 1312.311 | 31495.46 | 24 | 110 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 25.28 | 14.50 | 552.98 | 26.07 | 189.59 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 122 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 7.43 | 4.26 | 255.39 | 7.66 | 55.72 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 315 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.23 | 0.19 | 1.23 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 315 | | | | 12.21 | | | | | 46.14 | |
| | FUGITIVES- | | | 15000.0 | | 310 | | | | 7.50 | | | | | 27.90 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.39 | | | | | 0.09 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 345 | | | | 0.39 | | | | | 1.63 | |
| 2021 | **YEAR TOTAL** | | | | | | **377.10** | **213.24** | **12365.63** | **1093.19** | **7330.27** | **336.31** | **172.06** | **10557.94** | **847.49** | **5776.29** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | | Donna Gyles (28 | #REF! | | | | | | | | | | |
| **OPERATIONS** | **EQUIPMENT** | **RATING** | **MAX. FUEL** | **ACT. FUEL** | **RUN TIME** | | **MAXIMUM POUNDS PER HOUR** | | | | | **ESTIMATED TONS** | | | | |
| | **Diesel Engines** | **HP** | **GAL/HR** | **GAL/D** | | | | | | | | | | | | |
| **2022** | **Nat. Gas Engines** | **HP** | **SCF/HR** | **SCF/D** | | | | | | | | | | | | |
| | **Burners** | **MMBTU/HR** | **SCF/HR** | **SCF/D** | **HR/D** | **D/YR** | **PM** | **SOx** | **NOx** | **VOC** | **CO** | **PM** | **SOx** | **NOx** | **VOC** | **CO** |
| **DRILLING: West Auriga** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 54280 | 2621.724 | 62921.38 | 24 | 40 | 38.26 | 21.94 | 1029.23 | 39.45 | 286.94 | 18.36 | 10.53 | 494.03 | 18.94 | 137.73 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 2180 | 105.294 | 2527.06 | 2 | 6 | 1.54 | 0.88 | 52.82 | 1.58 | 11.52 | 0.01 | 0.01 | 0.32 | 0.01 | 0.07 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 40 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 2.64 | 0.49 | 37.00 | 2.96 | 8.01 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 36216 | 1749.2328 | 41981.59 | 24 | 10 | 25.53 | 14.64 | 877.48 | 26.32 | 191.45 | 3.06 | 1.76 | 105.30 | 3.16 | 22.97 |
| **Dive Support Vessel** - Horsepower same or less | | | | | | | | | | | | | | | | |
| than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 15448 | 746.1384 | 17907.32 | 24 | 15 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 1.96 | 1.12 | 67.37 | 2.02 | 14.70 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 5 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.30 | 0.17 | 10.47 | 0.31 | 2.28 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 8 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.49 | 0.28 | 16.75 | 0.50 | 3.65 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 27170 | 1312.311 | 31495.46 | 24 | 90 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 20.68 | 11.86 | 452.43 | 21.33 | 155.12 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 122 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 7.43 | 4.26 | 255.39 | 7.66 | 55.72 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 315 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.23 | 0.19 | 1.23 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 315 | | | | 12.21 | | | | | 46.14 | |
| | FUGITIVES- | | | 15000.0 | | 310 | | | | 7.50 | | | | | 27.90 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.39 | | | | | 0.09 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 345 | | | | 0.39 | | | | | 1.63 | |
| **2022** | **YEAR TOTAL** | | | | | | **284.96** | **163.10** | **9455.95** | **997.57** | **6670.07** | **288.92** | **148.29** | **8898.81** | **797.85** | **5459.97** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | Donna Gyles (28 | #REF! | |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2023 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 36216 | 1749.2328 | 41981.59 | 24 | 10 | 25.53 | 14.64 | 877.48 | 26.32 | 191.45 | 3.06 | 1.76 | 105.30 | 3.16 | 22.97 |
| **Dive Support Vessel** - Horsepower same or less | | | | | | | | | | | | | | | | |
| than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 15448 | 746.1384 | 17907.32 | 24 | 15 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 1.96 | 1.12 | 67.37 | 2.02 | 14.70 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 5 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.30 | 0.17 | 10.47 | 0.31 | 2.28 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 8 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.49 | 0.28 | 16.75 | 0.50 | 3.65 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 27170 | 1312.311 | 31495.46 | 24 | 90 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 20.68 | 11.86 | 452.43 | 21.33 | 155.12 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 122 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 7.43 | 4.26 | 255.39 | 7.66 | 55.72 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 315 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.23 | 0.19 | 1.23 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 315 | | | | 12.21 | | | | | 46.14 | |
| | FUGITIVES- | | | 15000.0 | | 310 | | | | 7.50 | | | | | 27.90 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.39 | | | | | 0.09 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 345 | | | | 0.39 | | | | | 1.63 | |
| 2023 | **YEAR TOTAL** | | | | | | **224.44** | **130.53** | **7773.46** | **934.66** | **6240.73** | **260.60** | **133.08** | **8116.26** | **768.41** | **5259.35** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | Donna Gyles (28 | #REF! | |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2024 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 36216 | 1749.2328 | 41981.59 | 24 | 10 | 25.53 | 14.64 | 877.48 | 26.32 | 191.45 | 3.06 | 1.76 | 105.30 | 3.16 | 22.97 |
| **Dive Support Vessel** - Horsepower same or less | | | | | | | | | | | | | | | | |
| than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 15448 | 746.1384 | 17907.32 | 24 | 15 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 1.96 | 1.12 | 67.37 | 2.02 | 14.70 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 5 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.30 | 0.17 | 10.47 | 0.31 | 2.28 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 8 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.49 | 0.28 | 16.75 | 0.50 | 3.65 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 27170 | 1312.311 | 31495.46 | 24 | 90 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 20.68 | 11.86 | 452.43 | 21.33 | 155.12 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 122 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 7.43 | 4.26 | 255.39 | 7.66 | 55.72 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 315 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.23 | 0.19 | 1.23 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 315 | | | | 12.21 | | | | | 46.14 | |
| | FUGITIVES- | | | 15000.0 | | 310 | | | | 7.50 | | | | | 27.90 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.39 | | | | | 0.09 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 345 | | | | 0.39 | | | | | 1.63 | |
| 2024 | **YEAR TOTAL** | | | | | | **224.44** | **130.53** | **7773.46** | **934.66** | **6240.73** | **260.60** | **133.08** | **8116.26** | **768.41** | **5259.35** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | | Donna Gyles (28 | #REF! |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2025 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 36216 | 1749.2328 | 41981.59 | 24 | 10 | 25.53 | 14.64 | 877.48 | 26.32 | 191.45 | 3.06 | 1.76 | 105.30 | 3.16 | 22.97 |
| **Dive Support Vessel** - Horsepower same or less | | | | | | | | | | | | | | | | |
| than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 15448 | 746.1384 | 17907.32 | 24 | 15 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 1.96 | 1.12 | 67.37 | 2.02 | 14.70 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 5 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.30 | 0.17 | 10.47 | 0.31 | 2.28 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 8 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.49 | 0.28 | 16.75 | 0.50 | 3.65 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 27170 | 1312.311 | 31495.46 | 24 | 90 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 20.68 | 11.86 | 452.43 | 21.33 | 155.12 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 122 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 7.43 | 4.26 | 255.39 | 7.66 | 55.72 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 315 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.23 | 0.19 | 1.23 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 315 | | | | 12.21 | | | | | 46.14 | |
| | FUGITIVES- | | | 15000.0 | | 310 | | | | 7.50 | | | | | 27.90 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.39 | | | | | 0.09 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 345 | | | | 0.39 | | | | | 1.63 | |
| 2025 | **YEAR TOTAL** | | | | | | **224.44** | **130.53** | **7773.46** | **934.66** | **6240.73** | **260.60** | **133.08** | **8116.26** | **768.41** | **5259.35** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | Donna Gyles (28 | #REF! | |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2026 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga (Substitution likely by other Drillship/DP Semi-Submersible of similar of lower horsepower)** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn (Substitution likely by other Drillship/DP Semi-Submersible of similar of lower horsepower)** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 36216 | 1749.2328 | 41981.59 | 24 | 10 | 25.53 | 14.64 | 877.48 | 26.32 | 191.45 | 3.06 | 1.76 | 105.30 | 3.16 | 22.97 |
| **Dive Support Vessel** - Horsepower same or less than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 15448 | 746.1384 | 17907.32 | 24 | 15 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 1.96 | 1.12 | 67.37 | 2.02 | 14.70 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 5 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.30 | 0.17 | 10.47 | 0.31 | 2.28 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 8 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.49 | 0.28 | 16.75 | 0.50 | 3.65 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 27170 | 1312.311 | 31495.46 | 24 | 90 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 20.68 | 11.86 | 452.43 | 21.33 | 155.12 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 122 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 7.43 | 4.26 | 255.39 | 7.66 | 55.72 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 315 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.23 | 0.19 | 1.23 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 315 | | | | 12.21 | | | | | 46.14 | |
| | FUGITIVES- | | | 15000.0 | | 310 | | | | 7.50 | | | | | 27.90 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.39 | | | | | 0.09 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 345 | | | | 0.39 | | | | | 1.63 | |
| 2026 | **YEAR TOTAL** | | | | | | **224.44** | **130.53** | **7773.46** | **934.66** | **6240.73** | **260.60** | **133.08** | **8116.26** | **768.41** | **5259.35** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 88 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, New JDC 2: W | | Donna Gyles (Air Quality Review | | Donna Gyles (2 | #REF! |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2027 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 36216 | 1749.2328 | 41981.59 | 24 | 10 | 25.53 | 14.64 | 877.48 | 26.32 | 191.45 | 3.06 | 1.76 | 105.30 | 3.16 | 22.97 |
| **Dive Support Vessel** - Horsepower same or less than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 15448 | 746.1384 | 17907.32 | 24 | 15 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 1.96 | 1.12 | 67.37 | 2.02 | 14.70 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 7200 | 347.76 | 8346.24 | 24 | 5 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.30 | 0.17 | 10.47 | 0.31 | 2.28 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/crev | 7200 | 347.76 | 8346.24 | 24 | 8 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.49 | 0.28 | 16.75 | 0.50 | 3.65 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/crev | 27170 | 1312.311 | 31495.46 | 24 | 90 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 20.68 | 11.86 | 452.43 | 21.33 | 155.12 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled) | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| West Essential generator CAT 3516E (SCR controlled) | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 122 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 7.43 | 4.26 | 255.39 | 7.66 | 55.72 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR) | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR) | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 315 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.23 | 0.19 | 1.23 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 315 | | | | 12.21 | | | | | 46.14 | |
| | FUGITIVES- | | | 15000.0 | | 310 | | | | 7.50 | | | | | 27.90 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.39 | | | | | 0.09 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 345 | | | | 0.39 | | | | | 1.63 | |
| 2027 | **YEAR TOTAL** | | | | | | **224.44** | **130.53** | **7773.46** | **934.66** | **6240.73** | **260.60** | **133.08** | **8116.26** | **768.41** | **5259.35** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |



Confidential

## AIR EMISSIONS CALCULATIONS - FIRST YEAR

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL | | CONTACT | | PHONE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| BP Exploration & Production Inc. | Green Canyon | 24, 825, 826, 86 | OCS-G 30300, | S (Mad Dog 2 P | DC 1: Wells A,B,C,D,F,G,H,I, | New JDC 2: W | Donna Gyles (Air Quality Review | | Donna Gyles (28 | #REF! |

| OPERATIONS | EQUIPMENT | RATING | MAX. FUEL | ACT. FUEL | RUN TIME | | MAXIMUM POUNDS PER HOUR | | | | | ESTIMATED TONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diesel Engines | HP | GAL/HR | GAL/D | | | | | | | | | | | | |
| 2028 | Nat. Gas Engines | HP | SCF/HR | SCF/D | | | | | | | | | | | | |
| | Burners | MMBTU/HR | SCF/HR | SCF/D | HR/D | D/YR | PM | SOx | NOx | VOC | CO | PM | SOx | NOx | VOC | CO |
| **DRILLING: West Auriga** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,337** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **36,288** | | | | | | | | | | | | |
| Main Engines: 6 x STX-MAN 16V32, 10877 hp ea. | PRIME MOVER>600hp diesel | 65262 | 3152.1546 | 36288.00 | 24 | 365 | 46.00 | 26.38 | 1003.33 | 47.44 | 345.00 | 96.64 | 55.42 | 2107.96 | 99.66 | 724.83 |
| E-Gen: 1 x MTU, 2145 hp | PRIME MOVER>600hp diesel | 2145 | 103.6035 | 2486.48 | 2 | 52 | 1.51 | 0.87 | 51.97 | 1.56 | 11.34 | 0.08 | 0.05 | 2.70 | 0.08 | 0.59 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 365 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 22.23 | 12.75 | 764.09 | 22.92 | 166.71 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 40 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 2.44 | 1.40 | 83.74 | 2.51 | 18.27 |
| **DRILLING: West Capricorn** | | | | | | | | | | | | | | | | |
| **(Substitution likely by other Drillship/DP Semi-** | **Average Daily Fuel Usage** | | | **10,487** | | | | | | | | | | | | |
| **Submersible of similar of lower horsepower)** | **Maximum Daily Fuel Usage** | | | **28,319** | | | | | | | | | | | | |
| Main Engines: 8 x CAT C-281-16, 6785 hp ea. | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E-Gen: 1 x CAT 3512B, 2180 hp | PRIME MOVER>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Small/Large Auxiliary Engines | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PIPELINE INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| **Seven Oceans** | **Average Daily Fuel Usage** | | | | | | | | | | | | | | | |
| | **Maximum Daily Fuel Usage** | | | | | | | | | | | | | | | |
| Main Engines: 15850 kW ( 21255 hp) | PIPELINE BURY BARGE diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Generators: 6 x 3360 kW (27035 hp) | SUPPORT VESSEL diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **FACILITY INSTALLATION: Example Vessels** | | | | | | | | | | | | | | | | |
| Signet Warhorse Tugs (1, 2 and 3), 12500 hp ea | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse GEN-Sets x 3: (583 kW/ 782 hp ea.) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse Tug 4 | MATERIAL TUG diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Signet Warhorse 4 GEN-Set: (583 kW/ 782 hp) | AUXILIARY EQUIP<600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **BOA Sub C** | **DP Fuel Usage** | | | **4,491** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **6,604** | | | | | | | | | | | | |
| BOA Sub C Main Engines: 30897 hp | VESSELS>600hp diesel(crew) | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Seven Arctic** | | | | | | | | | | | | | | | | |
| Main Engines: 6 x HiMSEN 9H32/40 (6036 hp ea) | VESSELS>600hp diesel | 36216 | 1749.2328 | 41981.59 | 24 | 10 | 25.53 | 14.64 | 877.48 | 26.32 | 191.45 | 3.06 | 1.76 | 105.30 | 3.16 | 22.97 |
| **Dive Support Vessel** - Horsepower same or less | | | | | | | | | | | | | | | | |
| than Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea) | VESSELS>600hp diesel | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Siem Stingray** | **DP Fuel Usage** | | | **3,302** | | | | | | | | | | | | |
| | **Transit Fuel Usage** | | | **15,566** | | | | | | | | | | | | |
| Siem Stingray Main Engines: 4 x Wartsila (2880 kW ea | VESSELS>600hp diesel | 15448 | 746.1384 | 17907.32 | 24 | 15 | 10.89 | 6.24 | 374.29 | 11.23 | 81.66 | 1.96 | 1.12 | 67.37 | 2.02 | 14.70 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 5 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.30 | 0.17 | 10.47 | 0.31 | 2.28 |
| Offshore Support Vessel - 312 ft Class | VESSELS>600hp diesel(support/cre | 7200 | 347.76 | 8346.24 | 24 | 8 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 0.49 | 0.28 | 16.75 | 0.50 | 3.65 |
| **TEMPORARY QUARTERS/ LIGHT CONSTRUCTION** | | | | | | | | | | | | | | | | |
| Island Venture: (4 x CAT C280-16, 3800kW ea and 2 x CAT 280-8, 2530 kW ea) | VESSELS>600hp diesel(support/cre | 27170 | 1312.311 | 31495.46 | 24 | 35 | 19.15 | 10.98 | 418.92 | 19.75 | 143.63 | 8.04 | 4.61 | 175.95 | 8.29 | 60.32 |
| **PRODUCTION** | | | | | | | | | | | | | | | | |
| Crane #1: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Crane #2: CAT C-15 DITA, 580hp | RECIP.<600hp diesel | 580 | 28.014 | 672.34 | 24 | 365 | 1.28 | 0.23 | 3.81 | 1.43 | 3.87 | 5.60 | 1.03 | 16.69 | 6.27 | 16.95 |
| Fast Rescue Craft: 1 x NORSAFE AS - 231hp | RECIP.<600hp diesel | 231 | 11.1573 | 267.78 | 1 | 52 | 0.51 | 0.09 | 7.12 | 0.57 | 1.54 | 0.01 | 0.00 | 0.19 | 0.01 | 0.04 |
| Lifeboats: 4 x BUKH BETA Engine, 28hp ea | RECIP.<600hp diesel | 112 | 5.4096 | 129.83 | 1 | 52 | 0.25 | 0.05 | 3.45 | 0.28 | 0.75 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 |
| Small/Large Auxiliary Engines | RECIP.<600hp diesel | 2500 | 120.75 | 2898.00 | 24 | 365 | 5.51 | 1.01 | 77.09 | 6.17 | 16.69 | 24.12 | 4.43 | 337.67 | 27.01 | 73.08 |
| T-GEN #1 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #2 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| T-GEN #3 (diesel): LM2500, 32000 hp | RECIP.>600hp diesel | 32000 | 1545.6 | 37094.40 | 24 | 50 | 22.56 | 12.93 | 775.33 | 23.26 | 169.16 | 13.53 | 7.76 | 465.20 | 13.96 | 101.50 |
| E-GEN: CAT 3516C, 3151 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| East Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| West Essential generator CAT 3516E (SCR controlled | RECIP.>600hp diesel | 3176 | 153.4008 | 3681.62 | 24 | 50 | 2.24 | 1.28 | 76.95 | 2.31 | 16.79 | 1.34 | 0.77 | 46.17 | 1.39 | 10.07 |
| Fire Water Pump: CAT 3516C, 3153 hp | RECIP.>600hp diesel | 3153 | 152.2899 | 3654.96 | 1 | 52 | 2.22 | 1.27 | 76.39 | 2.29 | 16.67 | 0.06 | 0.03 | 1.99 | 0.06 | 0.43 |
| Offshore Support Vessel - 312 ft Class | SUPPORT VESSEL diesel | 7200 | 347.76 | 8346.24 | 24 | 122 | 5.07 | 2.91 | 174.45 | 5.23 | 38.06 | 7.43 | 4.26 | 255.39 | 7.66 | 55.72 |
| T-GEN #1 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #2 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| T-GEN #3 (nat. gas): LM2500, 32000 hp | TURBINE nat gas | 32000 | 304768 | 7314432.00 | 24 | 315 | | 0.17 | 91.63 | 0.70 | 58.50 | | 0.66 | 346.36 | 2.66 | 221.14 |
| Water Injection Turbine #1: TITAN 130-20502 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| Water Injection Turbine #2: TITAN 130-20503 (w/SCR | TURBINE nat gas | 20518 | 195413.43 | 4689922.37 | 24 | 315 | | 0.11 | 58.75 | 0.45 | 37.51 | | 0.42 | 222.08 | 1.71 | 141.79 |
| | **MISC.** | **BPD** | **SCF/HR** | **COUNT** | | | | | | | | | | | | |
| | FLARE- Pilot & Purge | | 835 | | 24 | 315 | | 0.00 | 0.06 | 0.05 | 0.32 | | 0.00 | 0.23 | 0.19 | 1.23 |
| | FLARE- Upset | | 11250000 | | 24 | 50 | | 6.67 | 803.25 | 678.38 | 4370.63 | | 4.00 | 481.95 | 407.03 | 2622.38 |
| | PROCESS VENT- | | 3590 | | 24 | 315 | | | | 12.21 | | | | | 46.14 | |
| | FUGITIVES- | | | 15000.0 | | 310 | | | | 7.50 | | | | | 27.90 | |
| | GLYCOL STILL VENT- Flare | | 59665 | | 24 | 20 | | | | 0.01 | | | | | 0.00 | |
| | GLYCOL STILL VENT- VRU controlled | | 59665 | | 24 | 345 | | | | 0.39 | | | | | 1.63 | |
| 2028 | **YEAR TOTAL** | | | | | | **224.44** | **130.53** | **7773.46** | **934.27** | **6240.73** | **247.96** | **125.83** | **7839.77** | **755.28** | **5164.56** |
| | | | | | | | | | | | | | | | | |
| **EXEMPTION CALCULATION** | **DISTANCE FROM LAND IN MILES** | | | | | | | | | | | **4295.70** | **4295.70** | **4295.70** | **4295.70** | **86803.80** |
| | 129.0 | | | | | | | | | | | | | | | |

## AIR EMISSIONS CALCULATIONS

| COMPANY | AREA | BLOCK | LEASE | PLATFORM | WELL |
|---|---|---|---|---|---|
| BP Exploration & | Green Canyon | 780, 781, 824, 825, 826, 868, 869, 870 | OCS-G 30300, 15609, 33855, 09981, 09982, 33859, 28100, 36056 | ARGOS (Mad Dog 2 Project) | DC 1: Wells A,B,C,D,F,G,H,I, New J<br>DC 2: Wells A,B,C,D,E,F,G,H, New I<br>DC 3: Wells A & B<br>DC 4: Wells A,B,C,D,E,F,G, New H & I<br>DC 5: Wells, A, B & C<br>DC 6: Wells A & B (new) |

| Year | Emitted Substance | | | | |
|---|---|---|---|---|---|
| | PM | SOx | NOx | VOC | CO |
| 2018 | 44.13 | 22.73 | 1049.55 | 46.09 | 301.41 |
| 2019 | 173.18 | 88.33 | 4071.05 | 181.09 | 1173.00 |
| 2020 | 320.15 | 170.19 | 9314.54 | 775.31 | 5178.75 |
| 2021 | 336.31 | 172.06 | 10557.94 | 847.49 | 5776.29 |
| 2022 | 288.92 | 148.29 | 8898.81 | 797.85 | 5459.97 |
| 2023 | 260.60 | 133.08 | 8116.26 | 768.41 | 5259.35 |
| 2024 | 260.60 | 133.08 | 8116.26 | 768.41 | 5259.35 |
| 2025 | 260.60 | 133.08 | 8116.26 | 768.41 | 5259.35 |
| 2026 | 260.60 | 133.08 | 8116.26 | 768.41 | 5259.35 |
| 2027 | 260.60 | 133.08 | 8116.26 | 768.41 | 5259.35 |
| 2028 | 247.96 | 125.83 | 7839.77 | 755.28 | 5164.56 |
| Allowable | 4295.70 | 4295.70 | 4295.70 | 4295.70 | 86803.80 |

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46 of 522



**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<br>3 x 440V switchboards aft<br>2 x 440v switchboard forward<br>3 x 220V switchboards aft<br>2 x220V switchboards fwd |
| **Emergency Switchboards** | 1 x 11kV<br>1 x 440V<br>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<br>2 x HiPAP 501 (With one HAIN)<br>3 x Gyrocompasses<br>3 x Wind Sensors<br>3 x MRU's |
| **Independent Joystick** | Kongsberg cJoy |
| **Vessel Management System** | Kongsberg K-Chief |

# Stena IceMAX

## *Harsh Environment Dynamically Positioned Dual Mast, ICE-Class Drillship with Managed Pressure Drilling (MPD) Capabilities*


*For additional information, please contact:*
Stena Drilling Ltd, Greenbank Crescent, East Tullos, Aberdeen, AB12 3BG
Phone: +44 1224 401180 Fax: +44 1224 897089
SDLCommercial@Stena.com www.stena-drilling.com


### GENERAL INFORMATION

| | |
|---|---|
| RIG TYPE / DESIGN | Polar Class - Dynamically Positioned, Harsh Environment DP3 Drillship |
| CONSTRUCTION SHIPYARD | SHI (Samsung Heavy Industries) |
| YEAR ENTERED SERVICE / SIGNIFICANT UPGRADES | April 2012 / N/A |
| CLASSIFICATION | DNV: + 1A1 Ship-shaped Drilling unit(N) Cyber secure(Essential, +) BIS BWM(T) Crane-offshore DRILL(N, MPD) DYNPOS(AUTRO) E0 F(A,M) HELDK(S,H) PC(4) Recyclable UKVS Winterized(Cold, -20 °C, -30 °C) |
| FLAG | United Kingdom (UK) |
| DIMENSIONS | 228 m (Long) x 42m (Wide) x 19m (moulded depth) |
| DRAFTS | 12m (39.4 ft) operating / 8.5m (27.9 ft) transit |
| ACCOMODATION | 180, **upgradeable to 220** |
| VARIABLE DECK (OPERATING) | 17,500Mt @ 12m |
| TRANSIT SPEED | up to 12 knots |
| MAXIMUM WATER DEPTH | 3,000m designed / 2,285m outfitted **- Additional Riser Available**<br>10,000 ft designed / 7,500 ft outfitted **- Additional Riser Available** |
| MAXIMUM DRILLING DEPTH | 10,700m / 35,104 ft *With Offset Setback Standbuilding Capability |
| HELIDECK | Rated for EH-101 and S-92, Equipped with trace heating |

### DRILLING EQUIPMENT

| | |
|---|---|
| MAST | NOV Dual Hoisting and Drilling Tower - Offline Standbuilding Capability |
| HOOKLOAD CAPACITY | [MAIN] 1000st static hookload (2,000,000 lbs), **upgradeable to 1250st**<br>[AUX] 600st static hookload (1,200,000 lbs) |
| HOIST/DRAWWORKS | [MAIN] Hydraulic NOV Cylinder Hoisting Rig system with emergency lift/boost speed accumulator system<br>Rated to a capacity of 2,300,000lbs - **upgradeable to a capacity of 1400st**<br>[AUX] Hydraulic NOV Cylinder Hoisting Rig system with emergency lift/boost speed accumulator system<br>Rated to a capacity of 1,200,000lbs |
| MOTION COMPENSATOR | [MAIN] NOV Deadline Compensator with active heave compensation. Rated to 1040kips - **upgradeable to 1125st compensated**<br>[AUX] NOV Deadline Compensator with active heave compensation). Rated to 800kips |
| ROTARY TABLE | [MAIN] NOV RST 60-1/2", static load rating of 1250st, max torque 57,000ft-lbs<br>[AUX] NOV RST 49-1/2", static load rating of 800st, max torque 47,160ft-lbs |
| TOP DRIVE | [MAIN] NOV HPS-03 1000, 2 x ABB HXR 450 (LM6) AC-motors (2 x 990HP). 1,000st static load rating, max continuous drilling torque 68,888ft-lb. **Upgradeable to NOV TDX 1250**<br>[AUX] NOV HPS-03 750, 2 x ABB HXR 450 (LM8) AC-motors (2 x 1000HP). 750st static load rating, max continuous drilling torque 68,900 ft-lb |
| TUBULAR HANDLING | Drillfloor:<br>Main and aux well NOV MPT 200 Hydratong Roughnecks, tubular range 3 1/2" to 9 3/4". Maximum make-up/brake-out torque: 140/200kNm respectively. Casing tong KT-7585 data: Jaw range: 2 3/8" to 8 5/8" (inch), Max torque: 25,000 Ft-Lb<br><br>NOV horizontal pipe handling catwalk machine for single drillpipes, collars and casing. Pipe size range from 2 7/8" to 36" OD, for singles up to 50ft.<br><br>Setback:<br>Dedicated off-drillfloor pipe racking setback comprising dual NOV HR-IV quadruple stand height vertical pipe racking machines,3 ½" to 13 5/8", serving both main and aux wells. |
| RISER FEED | 1 x NOV horizontal riser handling catwalk for 80ft riser/slip-joints. |
| OFFLINE STANDBUILDING | 1 x NOV MPT 200 Hydratong Roughneck, tubular range 3 1/2" to 9 3/4"<br>Casing tong KT-7585 data: Jaw range: 2 3/8" to 8 5/8" (inch)<br>Max torque: 25,000 Ft-Lb<br><br>NOV horizontal pipe handling catwalk machine for single drillpipes, collars and casing. Pipe size range from 2 7/8" to 38" for singles up to 50ft.<br><br>1 x Torque Master;<br>3-1/2" to 14" Diameter (90 to 355mm) Tailstock<br>3-1/2" to 18" Diameter (90 to 457mm) Headstock<br>2-3/4" to 13-1/4" Diameter (70 to 336mm) Tailstock using extended tong dies<br>2-3/4" to 17-1/4" Diameter (70 to 438mm) Headstock using extended tong dies |
| MUD PUMPS | 4 x National FC2200 pumps – 7500psi |
| HP MUD SYSTEMS | Rated for 7,500psi – **Dual Fluid System upgradeable** |
| SOLIDS CONTROL | 5 x NOV Shale Shakers – VSM 300 |
| **MANAGED PRESSURE DRILLING (MPD)** | **Fully Integrated / Outfitted MPD System - DNV Approved & Field Proven**<br>- Integrated Riser Joint incorporating RCD (with dual passive seals) - 37ft, 2,000psi wp, 3,500kips, 18.75" ID, below tension ring, above ROPS.<br>- Multi-Level Pressure Relief System - Integrated MPD Control System.<br>- 2 x 175ft, 5,000psi API 17K, Flowspool Hoses and 1 x 150ft, 5,000psi.<br>- 5-1/8" 5,000psi wp Distribution Manifold, Pressure Relief Choke. |

### WELL CONTROL EQUIPMENT

| | |
|---|---|
| BOP STACKS | 2 x 6 Ram, 2 Annular, Cameron 18-3/4" 15,000psi TL BOP Stacks<br>*Features*<br>API S53 Class 8-A2-R6, Wet BOP weight of 660kips (< 320mT)<br>BOP Footprint 160" x 200",<br>Upper Blind Shear Rams fitted with Tandem Booster Bonnets<br>Upper Annular (LMRP) Cameron 18-3/4" 10,000psi DL<br>Lower Annular (Lower Stack) Cameron 18-3/4" 10,000psi DL<br>Vetco SHD H4 Wellhead Connector 27" (30" adapter kit available) |
| BOP CONTROL SYSTEM | Cameron MKIII Multiplex Primary & Secondary BOP Control Systems. Secondary BOP control system used for offline testing of setback BOP stack (minimising end of well maintenance time).<br>*Features;*<br>Acoustic and API 17H ROV Intervention Secondary Control Systems Emergency Disconnect, Autoshear & Deadman (AMF) Emergency Control Systems |
| RISER | Cameron Load King, 3,500kips, 80ft, 21" OD, Flanged Riser & 4.5" ID Auxiliary Lines (Choke, Kill, Hydraulics & Booster)<br>Telescoping Joint with 63ft Stroke and Dual Seal Assembly Subsea Services Remotely Operated Pull-in System (ROPS) (providing efficient hands free connection and disconnection of coflexip hoses). |
| RISER TENSIONER | 6 x 600kip, NOV N-Line Direct Acting Tensioners<br>*Features;* 48.5ft stroke, Riser Anti-Recoil System |
| CHOKE MANIFOLD | Cameron 3-1/16" 15,000psi Choke Manifold<br>*Features;* 3-1/16" 15,000psi Inlet / 4-1/16" 10,000psi Outlet<br>2 x 15,000psi Hydraulic Chokes, 2 x 15,000psi Manual Chokes<br>HDI Choke Control System |
| DIVERTER | GE KFDS-CSO 500psi WP Diverter<br>*Features;* Designed for 60.5" Rotary Table, Diverter Housing is 59" ID 21-1/4" Packer ID, Pressure Rating of 500psi in Complete Shut Off (CSO) |
| TREE STORAGE & HANDLING | 1 x NOV X-Mas Tree Gantry Crane, 264kips (120mT) Capacity<br>1 x NOV X-Mas Tree Trolley, 551kips (250mT) Capacity<br>4 x NOV X-Mas Tree Skids, 264kips (120mT) Capacity |
| MOONPOOL | 84ft x 41ft (25.60m x 12.48m) |

### POWER MANAGEMENT & MACHINERY

| | |
|---|---|
| MAIN POWER | 6 x Wartsila 16V32C diesel engines rated at 7.68 MW driving<br>6 x ABB AMG 1120MR10 LSE alternators rated at 7.45 MW |
| EMERGENCY POWER | 6 x Main power generators each capable of operating as designated emergency generator rated at 7.45 MW with automatic change-over function from main switchboards to supply ABB Unigear 11 kV emergency switchboard. |
| POWER DISTRIBUTION | 3 x ABB Unigear 11 kV switchboards with ABB REM 543 protection relays supplying 690 V, 440 V and 220 V distribution networks and with ABB ACS800 air-cooled variable speed drilling drives. |

### STORAGE CAPACITIES

| | | | |
|---|---|---|---|
| FUEL OIL | 16,565 $m^3$ \| 104,191 bbl | LIQUID MUD | Active: 1,004 $m^3$ \| 6,315 bbl<br>Reserve: 2,332 $m^3$ \| 14,668 bbl<br>Total: 3,336 $m^3$ \| 20,983 bbl |
| BASE OIL | 490 $m^3$ \| 3,082 bbl | BULK CEMENT | 472 $m^3$ \| 2,969 bbl |
| BRINE | 490.3 $m^3$ \| 3,082 bbl | BARITE | 315 $m^3$ \| 1,981 bbl |
| DRILL WATER | 4,350 $m^3$ \| 27,361 bbl | BENTONITE | 105 $m^3$ \| 660 bbl |
| POTABLE WATER | 1,778 $m^3$ / 11,183 bbl | SACK STORAGE | 250 tonnes \| 7,500 sacks |

### STATION KEEPING – PROPULSION SYSTEMS

| | |
|---|---|
| THRUSTERS | 6 x Rolls Royce UUC-505, 5.5MW, variable speed, fixed pitch, 360˚ azimuthing ice class thrusters driven by 6 x ABB ACS6000 5.5MW water-cooled variable speed drives. |
| DP SYSTEM | Kongsberg K-Pos DP-32 dual redundant control system and K-Pos DP-12 backup control system with 2 x HiPAP, 1 x HAIN, 3 x DGPS position reference systems. |
| MOORING SYSTEMS | 2 x 14.1 Mt Anchors |

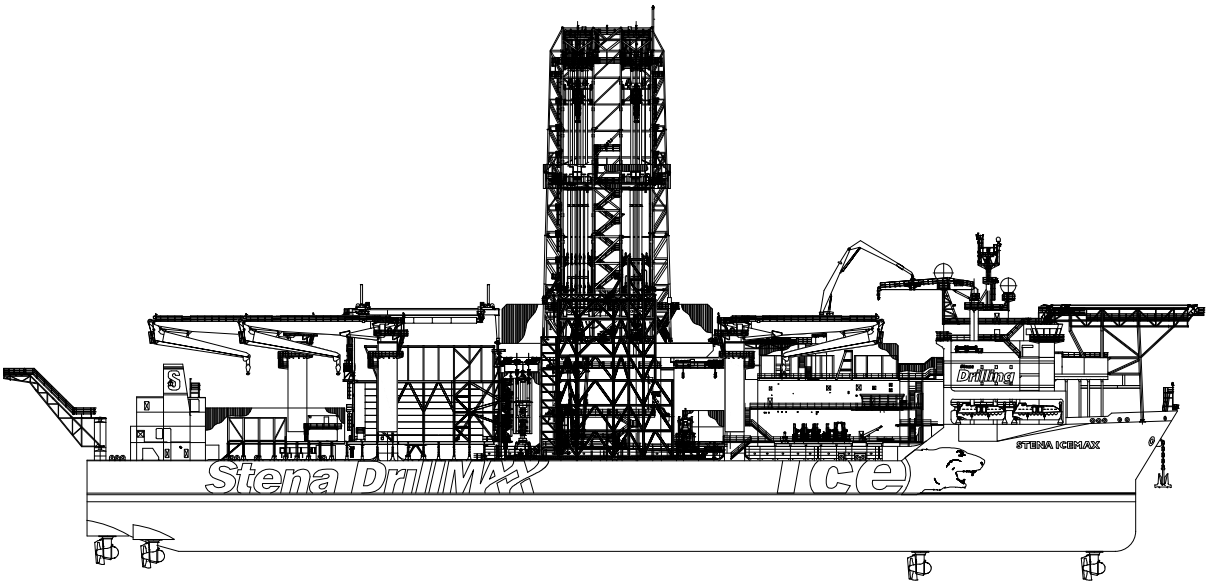
### CRANES

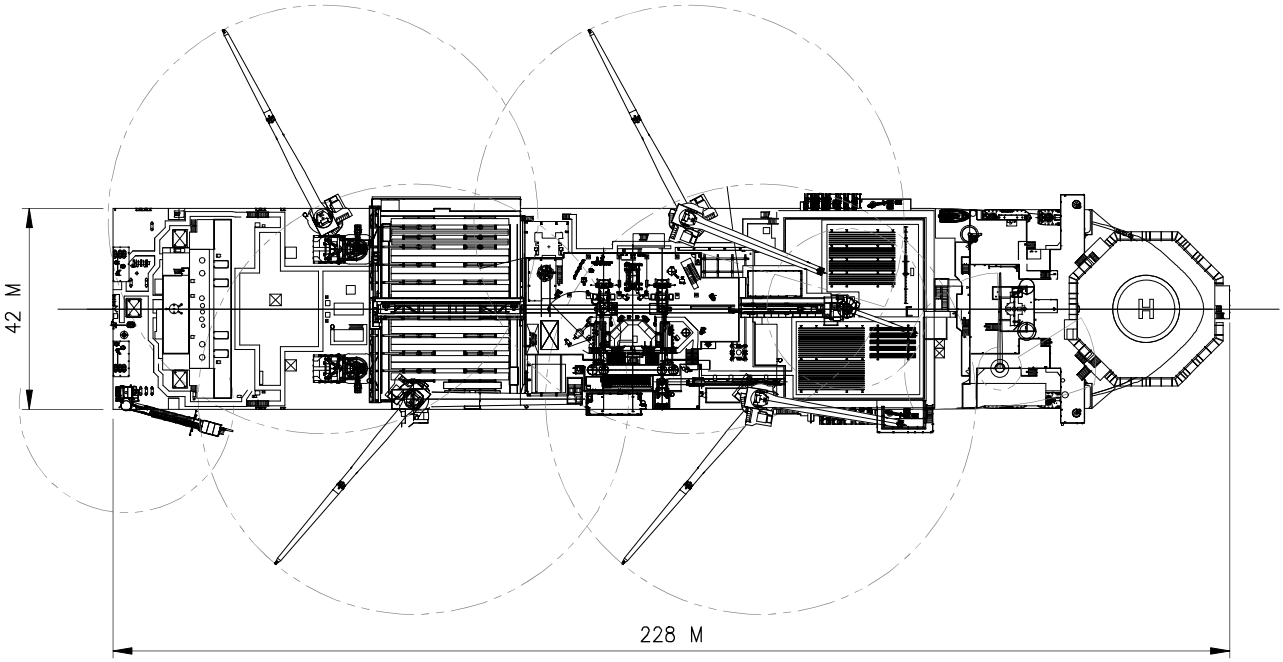
| | |
|---|---|
| CRANES | 4 x NOV Knuckle Boom Cranes, model OC3932KCE<br>1 fall: SWL 17mT @ 45m radius 5 fall: SWL 85mT @ 17m radius<br>All units personnel handling – **upgradeable to 100mT internal lift** |
| BOP HANDLING | BOP overhead gantry crane with 2 x 175mT main winches and 1 x 20mT auxiliary winches.<br>1 x BOP skid rated to 370mT 2 x LMRP skids rated to 350mT each.<br>Dual BOP/LMRP sea fastening. |
| RISER HANDLING | Riser overhead gantry crane including riser handling yoke.<br>Crane rated to 2 x 20mT, yoke rated to 2 x 17.5mT |
| TUBULAR HANDLING | NOV Pipehandling Knuckle Boom Crane, model C2201 PCE<br>Gripper yoke size & Type: 2-7/8" to 20", 3.5mT SWL<br>Without gripper: SWL 14mT @ 17m radius<br>SWL 6mT @ 29m radius |

Revision Date: 07 OCT 2020


These specifications are intended for general reference only. Equipment and Specifications are subject to change based on Contractual Status and Customer Requirements. Stena Drilling Limited operates and maintains the equipment in compliance with company policies and procedures.


Stena Drilling
CARE, INNOVATION & PERFORMANCE



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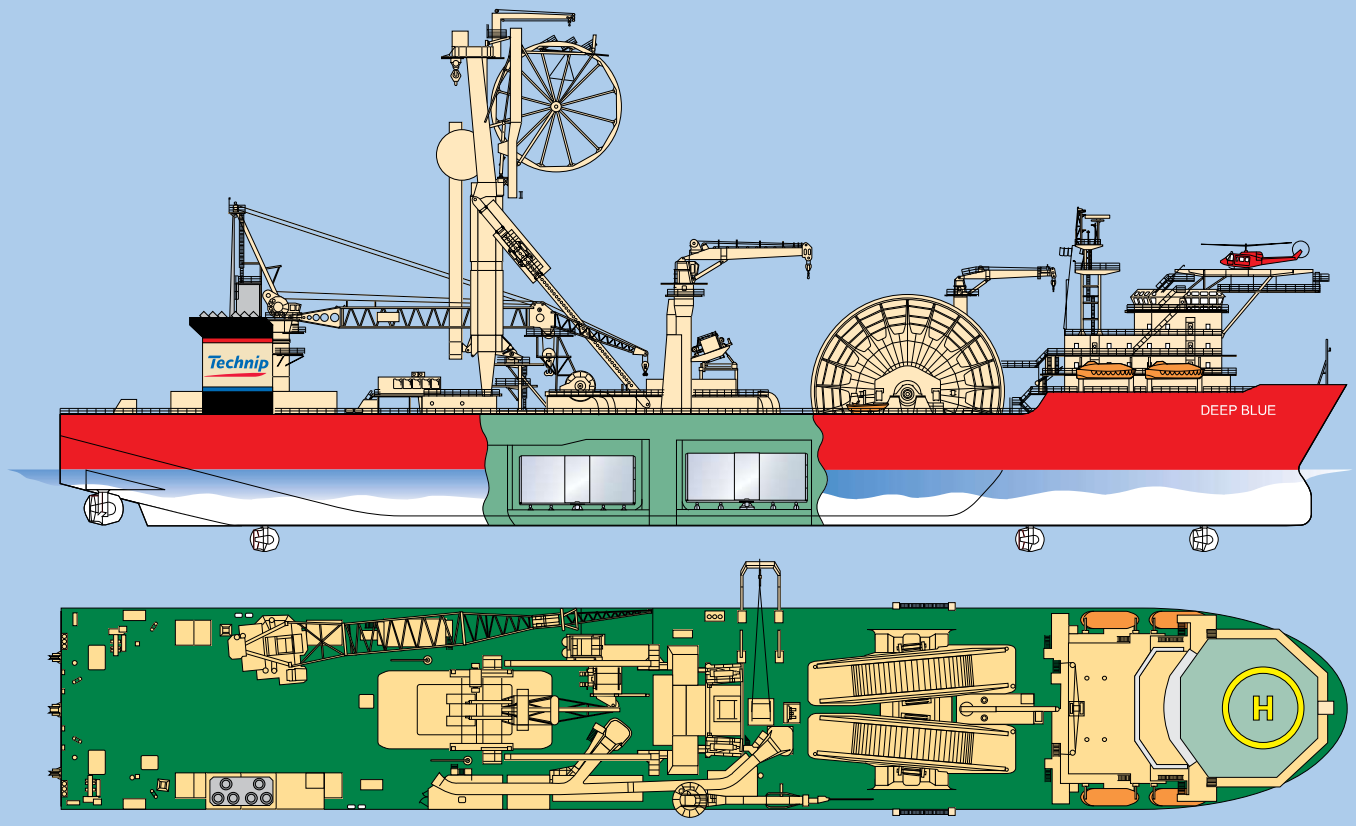
# Deep Blue

One of the most advanced pipelay and construction vessels of the subsea industry and the flagship of the Technip Fleet

Technip

take it further®

# Deep Blue




The Deep Blue is one of the most advanced pipelay and construction vessels of the subsea industry and the flagship of the Technip Fleet. The vessel combines the highest technology for reel-lay, J-lay and flexi-lay operations. She supports Technip's operations in the most demanding environments and offers clients unique and cost effective solutions for the development of deep and ultra deepwater fields.

Deep Blue is a versatile and highly capable vessel. For the first time ever, a vessel is able to combine the installation of all types of flexible and rigid risers (reeled and J-Lay), flowlines and umbilicals, and support developments in water depths up to 3,000m (9,842ft) at an optimised cost.

The Deep Blue has been designed to offer the best technical solutions to the needs of our clients wishing to develop deep and ultra deep fields at optimised costs.

The Deep Blue is particularly well adapted to Gulf of Mexico, West African or Brazilian requirements thanks to her unique tensioning capacity, the large range of pipe products and payload (10,000 Te of products) she can carry / install.

# Deep Blue references

## World records and Industry firsts

| CLIENT | PROJECT | SCOPE OF WORK | WATER DEPTH | YEAR |
|---|---|---|---|---|
| Shell | Perdido (Gulf of Mexico) | **World records:**<br>- deepest installed reeled pipe<br>- deepest installed reeled in-line structure (PLET) | <br>2,957m (9,701ft)<br>2,850m (9,350ft) | 2009 |
| Shell | Na Kika (GoM) | **World records:**<br>- deepest Pipe-in-Pipe (PiP) reel-lay<br>- deepest PiP J-lay<br>- deepest PiP Steel Catenary Riser | <br>2,115m (6,940ft)<br>1,912m (6,272ft)<br>1,938m (6,360ft) | 2005 |
| | | **Industry firsts:**<br>- First reeled PiP in-line sleds<br>- First reeled flowline shorter than water depth<br>- First internal buckle arrestors used in PiP<br>- First subsea Remotely Operated Vehicle SCR transfer operation<br>- First reeled FSHR | | |

## Most challenging and technically advanced projects

| CLIENT | PROJECT | SCOPE OF WORK | WATER DEPTH | YEAR |
|---|---|---|---|---|
| Anadarko | Caesar Tonga (GoM) | EPCI contract for installation of 2 Steel Lazy Wave Risers (2km each) with 1st End Transfer to Spar - first time in GoM | 1300m - 1560m (4,256ft - 5,118ft) | 2012 |
| Total | Pazflor (Angola) | EPCI contract for 50km of production PiP (12"/16") with flextails, 18km of 11" production line with flextails and 10 in-line structures, 28km of 10" water injection with flexible riser and 2x10" Integrated Production Bundles (IPBs) | 600m - 1,200m (1,968ft - 3,936ft) | 2011 |
| BP | Block 31 PSVM (Angola) | EPCI contract for 45km of 12" water injection line with a 15mm thick HDPE liner and 20km of gas injection line | 1,800m - 2,100m (5,905ft - 6,889ft) | 2010 |
| Tullow | Jubilee (Ghana) | EPCI contract for 31km of 12" production line, 5km of 10" gas injection line, 11km of 12" water injection line, 7 anchoring piles, 2 riser base manifolds (220 Te each) and 8 production and injection manifolds | 900m - 1,700m (2,952ft - 5,577ft) | 2010 |
| Petrobras | Cascade Chinook (GoM) | EPCI contract for 10km of 9" production line, 84km of 6" gas export line, 9 anchoring piles, 2 manifolds, 2 pump stations, 5 reel laid FSHRs | 2,400m - 2,700m (7,873ft - 8,858ft) | 2009 |
| Shell | Perdido (GoM) | EPCI contract for 13km of 6" circulation line with SCR connected to Perdido DVA spar | 2,250m - 2,957m (7,381ft - 9,701ft) | 2009 |
| Petrobras | PDET (Brazil) | EPCI contract for 56km of 18" insulated gas export line installed by the J-lay method and one 18" J-Lay FSHR | 100m - 1,800m (329ft - 5,900ft) | 2007 |
| Total | Dalia SURF (Angola) | EPCI contract for 86km of steel production, water and gas injection flowlines, 70km of steel tube umbilicals and 25km of flexible risers<br>First use of the Integrated Production Bundle, an innovative and proprietary technology | 1,200m - 1,500m (3,937ft - 4,922ft) | 2006 |
| Burullus Gas | Simian Sapphire (Egypt) | EPCI contract for 390km of rigid pipelines (diameter range 4" to 26") using both reel and J-lay methods. subsea control system including 250km of electro-hydraulic umbilicals | 90m - 1,100m (295ft - 3,609ft) | 2006 |
| Shell | Nakika (GoM) | EPCI contract for 26km of production PiP (8" x 12") with SCR, reel-lay installation, 46km of 8" flowline with SCR, 12km of gas injection flowline and production PiP (10" x 16") installed by J-Lay | 1,861m - 2,115m (6,105ft - 6,9401ft) | 2005 |
| Williams Field Services | Boomvang & Nansen Spars (GoM) | Pipeline system design and EPIC contract for 2 export lines.<br>Engineering and installation of:<br>- 195km of 12", 16" and 18" rigid pipelines and SCRs<br>- 15 risers | 1,054m - 1,121m (3,460ft - 3,678ft) | 2001 |

# A unique multipurpose installation and construction vessel

Deep Blue mobilising at the Technip Spoolbase in Mobile, Alabama

Deep Blue on the Boomvang and Nansen project in the Gulf of Mexico

## Pipelay equipment

**Reel-lay: 550 Te, a unique tensioning capacity to reel-lay the largest range of deep lines**

The Deep Blue's laying system is designed around a powerful tiltable tower, equipped with two quad track tensioners capable of sustaining 550 Te. What makes the Deep Blue really unique is her ability to lay both flexible (up to 24" outer diameter) and rigid reeled lines (from 4" to 18" overall diameter, including PiP) down to 3,000 meters water depth (9,842 ft).

The moonpool-fitted tower is fed either by two reels for laying rigid pipe or by two carousels for flexible lines (vertically).

The tensioners are designed to handle both products. This allows her to lay flexible and rigid lines within the same trip with a maximum load of 10,000 Te of product.

A key feature is also her capability to lay Reeled Steel Catenary Risers (RSCRs) and Hybrid Catenary Risers (HCRs).

**J-Lay: 770 Te tensioning capacity**

The Deep Blue also incorporates a J-Lay system. This allows the laying of lines up to 28" O.D., which may be required as part of a large field development, or laying the non reelable portion of specific rigid lines of a more complex design, such as internally clad SCRs. The J-Lay configuration provides headclamps capable of taking pipe with or without collars or friction pads. The range of laying angles for the tower varies between 90° and 58°.

## Storage capabilities

The Deep Blue is fitted with twin reels of 2,800 Te capacity each which are used for the storage of reeled rigid pipeline.

Two built-in under deck carousels are used as the main storage capability for flexible pipeline.

Finally, the Deep Blue has been designed with a large multi-purpose working deck which can either be used for transport of subsea structures to be installed in any offshore development or additional flexible product stored on portable reels. During J-lay operations, the deck is fitted with two bins, each capable of storing 2,000 Te of quads.

## Cranage & deck winches

The vessel's main crane has been designed for offshore lifts ranging from 60 Te at 55m (180ft) radius up to 400 Te at 18m (59ft) radius enabling efficient subsea equipment installation through its active heave compensation system. In addition to the main deck crane, a number of smaller utility cranes ranging from 10 to 40 Te capacity are provided in way of the pipelaying equipment.

Two large winches are provided in support of pipelay operations. These are:

- 327 Te SWL (360 Te dynamic) Traction and Storage Winch are provided for abandonment and recovery of pipelines with tensions 150 Te<T<350 Te.
- 150 Te Initiation/A&R Winch is provided for initiation of pipelines using primarily Suction Piles, diverless latch and pipe transfer, etc. Also for abandonment and recovery of pipelines with tensions up to 150 Te.
- 15 Te Fast Winch with 3500m wire for quick and reliable light load deployment to seabed.
- 550 Te Pipe Follower for abandonment and recovery of pipelines with tensions 360 Te<T<550 Te. This is a flexible used as A&R equipment through the two tower tensioners.

Deep Blue mobilising at the Technip spoolbase in Dande, Angola

Deep Blue bridge

## Remotely Operated Vehicles (ROVs)

Pipelay and construction activities are supported by two identical Triton® XLX advanced workclass ROVs. Both systems are 3,000 m (10,000 ft) rated. One vehicle is deployed through the moonpool on the vessel centre line and the other over the vessel side via a customised heavy duty A-frame. Both systems are cursor deployed.

The ROVs are deployed in powered cages complete with tether management systems and have 1000 m (3,280 ft) extended tethers fitted. State-of-the-art manipulators, sensors and tooling are permanently fitted. Client-supplied tooling is easily interfaced via dedicated valve packs and hydraulic systems. Both the ROVs and powered cages are fitted with survey quality, North-seeking fibre optic gyros and bathymetric systems. Each system is configured with a 150 hp power train and can accommodate any industry standard work package. The ROVs are operated from a dedicated control room built into the vessel and customised workshop and storage facilities are also provided.

## Station keeping

The vessel is dynamically positioned during pipelay operations. Two main azimuthing propeller units are provided aft for propulsion and DP. Additionally, four further retractable azimuthing thruster units and two tunnel thrusters are provided for DP. A total of 25.6 MW (34,000 hp) thruster power is provided.

## Integrated Vessel Management System (IVMS)

A fully integrated Kongsberg control system is installed. This monitors and, where applicable, controls all machinery for power generation and propulsion. Integral with the IVMS is a Kongsberg Simrad SDP-22 Dual redundant dynamic positioning system.

## Machinery / propulsion

The vessel's main machinery consists of six diesel driven alternators (split between two separate machinery spaces) providing a total of 33.6 MW (45,000 hp) to the vessels electrically driven propulsion systems and various other consumers.

## Transit speed

The transit speed of the vessel allows short transit time between spoolbase and field locations and shorter international transit between projects.

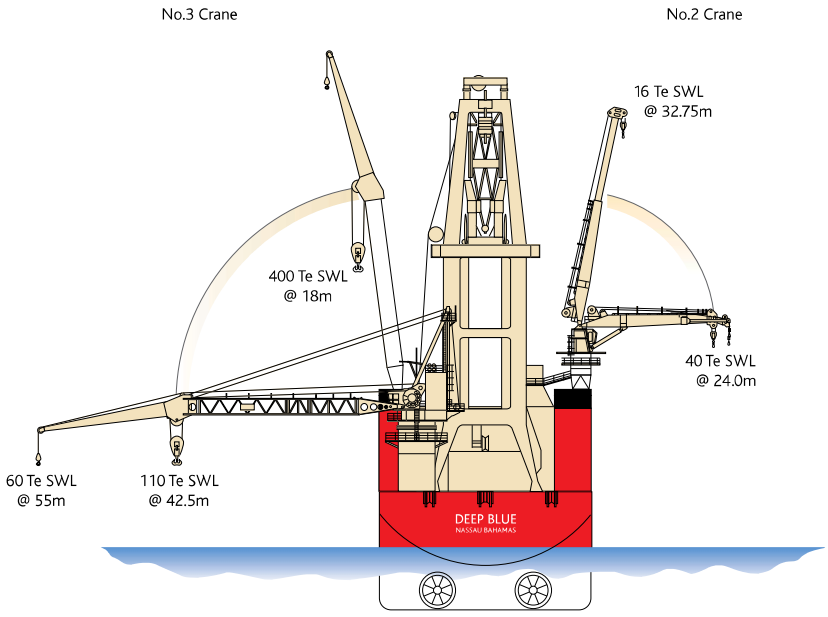
## Hydrotest system

A dedicated hydrotest system provides high and low pressure technical fresh water at outlets adjacent to the main reels, carousels and moonpool for testing pipelines. The test pumping system provides for:

- a single low pressure supply of 800 ltrs/min @ 10 bar (211 gpm @ 145 psi)
- a dual high pressure with supplies of 120 ltrs/min @ 220 bar or 25 ltrs/min @ 600 bar (32 gpm @ 3,190 psi or 6.6 gpm @ 8,700 psi).

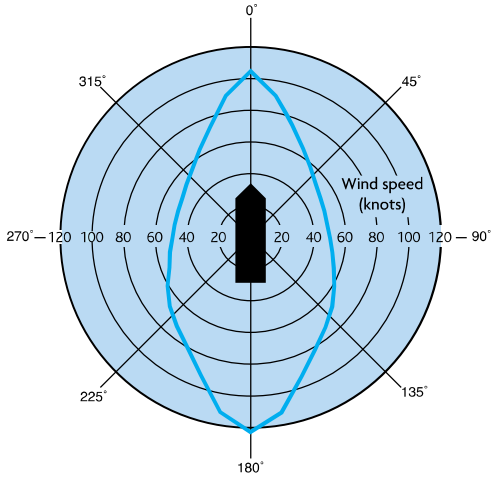
# Key features

- Maximum water depth: 3,000 m (9,842 ft)
- Maximum pipe diameter range:
  - Rigid reeled: 4" to 18" O.D.
  - Flexible: up to 24" O.D.
  - Rigid J-Lay: 4" to 28" O.D.
  - Umbilicals: 70mm to 250mm (2 3/4" to 9 13/16")
- Maximum pipe payload: 10,000 Te (11,023 short tons), can consist of the combination of:
  - Rigid lines (2 reels): 5,600 Te (6,170 short tons)
  - Flexible lines/umbilicals (2 carousels): 2,000 Te and 1,540 Te (2,240 short tons and 1,698 short tons)
  - Portable reels (8 reels): 8 x 300 Te (330 short tons)
  - Rigid pipe quads: 4,000 Te (4,409 short tons)
  - Subsea structure: 3,000 Te (3,307 short tons)
- Heavy lift capability: 400 Te
- Moonpool: clear opening for 7.5 m wide x 15 m long (24 ft x 49 ft)
- Worktable over moonpool: clear opening for 5 x 5 m (16'4" sq) footprint equipment with 770 Te swl holding capacity
- Tower equipped with:
  - 2 stacked quad-track tensioners and centraliser modules, the total traction capacity is 550 Te (2 x 275 Te) dynamic loading. Tensioners to allow clear passage of 1.8m (5'10") diameter pipe attachments.
  - Rigid pipe straightener
  - Top module with crane, winch and crown block transfer assembly
  - Rigid pipe aligner
  - Flexible pipe aligner
  - J-Lay system on aft face of the pipe tower
  - Hinged at deck level and capable of jacking from 32° (measured from horizontal) to 90°. Rigid pipelay takes place between 60° and 85°, J-Lay 58° to 90° and flexible pipelines generally laid at 90°.
- PLET handling system




DP Footprint

Considered Available Power: 100% Thrusters capacity
Considered Current: Nil
Considered Pipelay force: 55 tons horizontal pulling from the stern



# Specifications

## Principal dimensions

| | |
|---|---|
| Length Overall | 206.5 m (677'6") |
| Length B.P. | 191.8 m (629'3") |
| Breadth, Moulded | 32.0 m (105') |
| Depth, Moulded | 17.8 m (58'5") |

## Operating draft

Typically 9 m (29'6")
Maximum 10 m (32'9")

## Displacement

50,122 Te, at 10 m draft (55,234 short tons)

## Gross tonnage

33,791 Te

## Pipelaying systems

Operational water depth - 72 m to 3,000 m (236 ft to 8,200 ft)
Rigid Pipe (Reeling) - 4" to 18" O.D. - up to 5,600 Te* (6,170 short tons)
Rigid Pipe (J-Lay) - 4" to 28" O.D. - up to 4,000 Te* (4,400 short tons)
Flexible Pipe - up to 24" O.D. - up to 5,900 Te (6,490 short tons)

* Deadweight and stability restrictions apply for combined loading

## Cranage

**Crane # 1**
Type - Telescopic box boom, ram luffing
Location - Between main reels on centreline forward
Reach and Capacity 12 Te @ 15 m, 8 Te @ 23 m (13.2 short tons @ 49', 8.8 short tons @ 75')

**Crane # 2**
Type - Telescopic box boom, ram luffing
Location - Starboard side aft of main reels
Reach and Capacity:
40 Te @ 24.0 m (44 short tons @ 79ft) (harbour use)
16 Te @ 32.75 m (18 short tons @ 107ft) (harbour use)

**Crane # 3**
Type - Lattice boom, rope luffing with 15 m flying jib and active heave compensation system.
Location - Port side aft of main moonpool
Reach and Capacity:
400 Te @ 18 m (441 short tons @ 59') (harbour condition)
110 Te @ 42.5 m (121 short tons @ 139') (harbour condition)
60 Te @ 55m (66 short tons @ 180') (harbour condition)

## Capacities

| | | |
|---|---|---|
| Fuel (including day tanks) | 4,054 $m^3$ | (25,498 bbl) |
| Lube and Hydraulic Oil | 235 $m^3$ | (1,478 bbl) |
| Fresh water | 892 $m^3$ | (5,610 bbl) |
| Technical water | 1,444 $m^3$ | (9,082 bbl) |
| Ballast | 19,242 $m^3$ | (121,028 bbl) |
| Flume tank | 1,661 $m^3$ | (10,447 bbl) |

## Deck services

Deck loading
- Upper deck aft of moonpool 10 Te/$m^2$ (14 lb/$in^2$)
- Moonpool covers 3 Te/$m^2$ (4 lb/$in^2$)
- Rest of upper deck 5 Te/$m^2$ (7 lb/$in^2$)
- Free deck area (aft of moonpool) Approx. 690 $m^2$ (7,400 sq.ft)

## DP system

**(Dynpos AUTR - Class II)**
A Kongsberg Simrad SDP22 dual redundant dynamic positioning system is fitted.
Reference systems provided include the following:
3 x Robertson RGC11 gyro compasses
1 x MRU 5 vertical reference unit
2 x MRU 2 vertical reference units
3 x DEIF879 wind sensors
3 x Sercel DGPS and 2 x C.NAV DGPS
2 x Hydro-acoustic systems (HIPAP)
1 x KS mark 8 light weight taut wire (300 m max)
ERN 99.99.99
1 x fan beam

## Power plant

Total installed normal power
33.6 MW at 6.6 kV (45,000 hp)
Emergency power 1 MW at 440V
Transit thrust power
11 MW (2 thrusters in use)
14 MW (3 thrusters in use)
DP thrust power
25.6 MW (8 thrusters in use)

## Propulsion

Vessel is equipped with eight (8) thrusters as follows:
- 2 x 5.5 MW (7,000 hp) KaMeWa type UUC 7001 non-retracting azimuthing thrusters aft for propulsion and DP (each unit has thrust of 87 Te in bollard condition).
- 1 x 3 MW (4,000 hp) KaMeWa type UL 4001 retractable azimuthing thruster aft for propulsion and DP.
- 3 x 3 MW (4,000 hp) KaMeWa type UL 4001 retractable azimuthing thrusters forward below keel for DP (each unit has thrust of 49 Te in bollard condition).
- 2 x 1.3 MW (1,740 hp) KaMeWa type TT2200-BMS-CP tunnel thrusters in the bow used for DP and maneuvering.

All azimuthing thrusters have a fixed pitch propeller (FPP) and variable speed.
The tunnel thrusters have a controllable pitch propeller (CPP) and fixed speed.

## Endurance (& Fuel Consumption)

| | |
|---|---|
| Transit | 51 days (67 $m^3$/day) |
| DP operations | 100 days (34 $m^3$/day) |
| Standby conditions | 170 days (20 m3/day) |

## Transit speed

10 knots

## Helideck

Sikorsky S61N type helicopters

## Accommodation

Hotel accommodation is provided for a total complement of 160 persons, comprising:
4 x Executive, single occupancy cabins
18 x Single person cabins
59 x 2-person cabins
6 x 4-person cabins

## Lifesaving appliances

4 x 80 man TEMPSC located two port and two starboard of accommodation.
Inflatable life rafts are installed on upper deck with 100% POB capacity port and starboard.

## Flag

Bahamas

## Call sign

C6RM8

## Classification

+ 1A1 DYNPOS-AUTR, EO, ICS, ISM, SBM, HELDK

## Year built / builder

2001 / Hyundai Mipo Dockyard, Korea

## Owners

Technip

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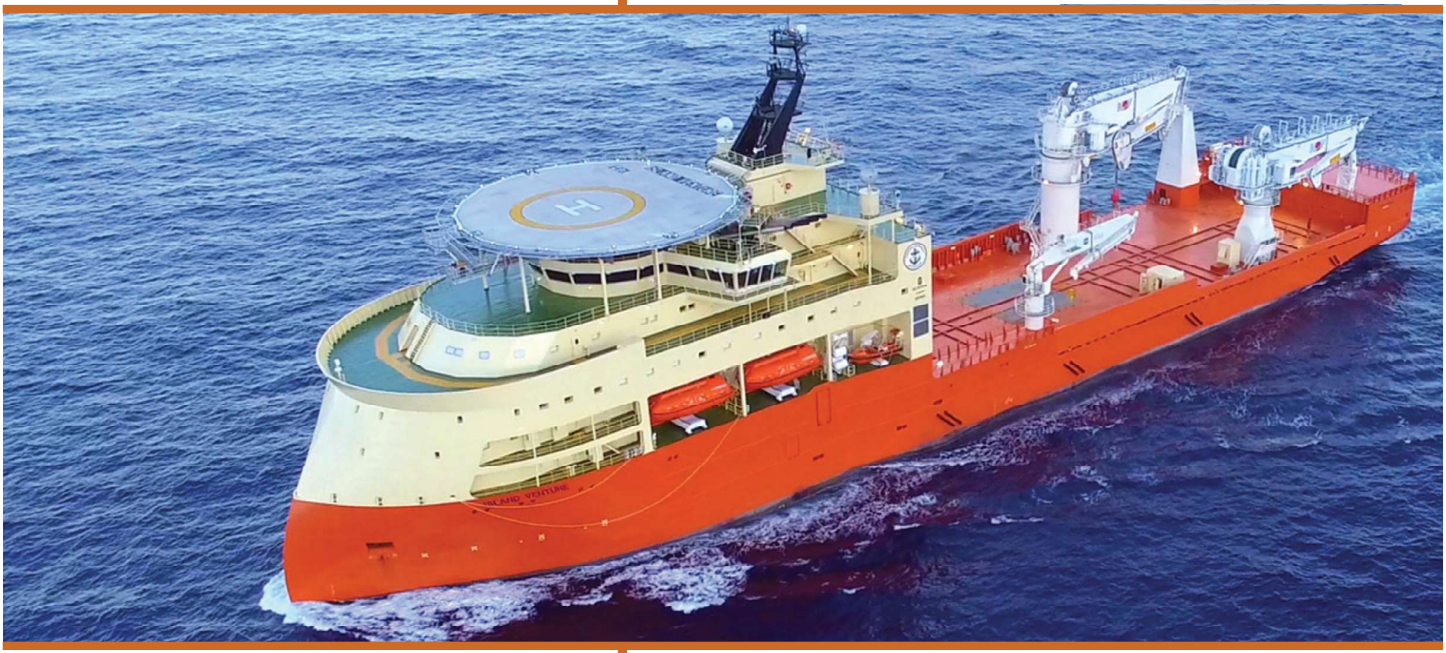
# M/V ISLAND VENTURE

## Construction and Light Well Intervention Vessel



## M/V Island Venture

### SPECIFICATIONS

| | |
|---|---|
| **REGISTRATION** | |
| Vessel Type | Offshore Construction and Light Well Intervention Vessel |
| Year Built | 2014 |
| **ACCOMODATIONS** | |
| Accommodations | 239 |
| **DIMENSIONS** | |
| Dimensions | 524 ft. X 98.42 ft. X 39.37 ft. (159.7 m X 30 m X 12 m) |
| Draft (Loadline) | 26.25 ft. (8 m) |
| Cargo Deck Area | 25,618.1 sq. ft. (2,380 sq. m) |
| **SPECIAL FEATURES** | |
| Positioning | DP-3 |
| Main Crane | 250 t at 14 m outreach, 3,000 m wire |
| Deck Crane | 20 t at 40 m outreach, 500 m wire |
| Helideck | 85.63 ft. diameter (26.1 m) |
| ROV | Two (2) Schilling UHD 200 hp |

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# M/V HOLIDAY | Anchor Handling Tug Supply Vessel

## M/V Holiday

### SPECIFICATIONS

| | |
|---|---|
| **REGISTRATION** | |
| Hull | 245 |
| Vessel Type | Anchor handling Tug Supply Vessel |
| Year Built | 2010 |
| **ACCOMODATIONS** | |
| Accommodations | 47 |
| **DIMENSIONS** | |
| Dimensions | 288 ft. X 66 ft. X 29.6 ft (87.78 m X 20.12 m X 8.99 m) |
| Draft (Lightship) | 16 ft. (4.88 m) |
| Draft (Loadline) | 23 ft. (7.01 m) |
| Clear Deck | 116 ft. 10 in. x 54 ft. (35.36 m x 16.46 m) |
| **SPECIAL FEATURES** | |
| Positioning | DP-2 |
| Main Crane | One (1) 150MT |
| Deck Crane | Two (2) 5T |
| ROV | Two (2) Schilling Robotics UHD 200HP 4000M Systems |
| Helideck | Modular aluminum construction. Certified for Sikorsky S-92 helicopter. Certified under CAP 437, day or night operations. |

TechnipFMC

# Olympic Challenger

# Olympic Challenger

The Olympic Challenger is modern multi-purpose construction support vessel capable of carrying out a number of diverse tasks in shallow and deep-water. She will relocate to the Gulf of Mexico in March 2023 to carry out a number projects for TechnipFMC and will be available for our clients through 2Q2024 with an options to extend the charter.

## Key particulars

The vessel has a LOA of 348' (106m) and a breadth of 69' (21m). She is a high specification 2008 build DP2 vessel with a lifting capacity of 250t (AHC 200t single line) and a secondary subsea crane rated to 20t. The free deck space is 3,280' (1000m) with a payload capacity of 2000t with a working moonpool of 23 x 23' (7.2m). The vessel can accommodate product deployment via a Reel Drive System with Horizonal lay over the side or Vertical lay over moonpool deployment via appropriate back deck equipment. The vessel is also equipped with dual Schilling HD 150 HP WROV's rated to 3000m, one is garage deployed over the side and the second is via a dedicated ROV moonpool. This configuration is extremely well suited to deployment in heavy weather situations. High quality accommodations are provided for 100 persons in single and two person cabins.

## Capabilities

Typical Subsea capabilities include and not limited to:-

### Construction mode/IMR mode

- Umbilical and flexible flowline installation (horizonal HLS or Vertical VLS)
- Rigid/Flexible/Umbilical Jumper install, EFL/HFL SCM's etc
- Structure Installation, Manifolds, Pumps, Piles etc) Crane operations to 3000m
- Crossing installation
- Commissioning support
- Touchdown monitoring, pre and post lay survey/inspection

The vessel can be offered in a number of configurations to support work scope requirements but typically there will be 3 standard loadouts: low, mid and high range. A low scenario could be considered a single WROV and inspection tasks and minimal back deck crew, A mid scenario could be considered a dual WROV and back deck crew for ligh construction tasks.

For more information or enquiries please contact your Account Manager or Andy Duncan – Director of IMR, Diving and Construction on andy.duncan@external.technipfmc.com Tel 281 450 7041.

# Specifications

## Principal dimensions

- Length overall 105.9m
- Length between PP 94.7m
- Breadth moulded 21.0m
- Depth 8.5m
- Maximum draft 6.6m
- Gross tonnage 6619Te
- Deadweight tonnage 1985Te

## Craneage

- Main subsea crane
  - Starboard side
  - SWL main 250t
  - Maximum dynamic load 350t
  - Equipped with AHC and CT on main winch
  - 20t AHC and CT aux winch and 2 x 4 t tugger winches
- Secondary subsea crane
  - Port side
  - SWL main
  - SWL 10t at 20m outreach
  - SWL 20t at 10m outreach
  - AHC- Yes. Case1 and case2. (0-10t and 10-20t)
  - CT- Yes. Case1 and case2. (0-10t and 10-20t)
- Deck crane
  - Port side deck crane
  - SWL 3t, Outreach - Max 15m | Min 1.7m
  - Staboard side deck crane
  - SWL 3t, Outreach - Max 15m | Min 1.7m
  - ROV hangar crane
  - SWL 1.05t, Max outreach – 16.8m

## Deck space and load

- 1,000m2 Including moonpools/800m2 aft of moonpools
- Maximum deck load is 2000t
- Deck strength: 5t/m2 and 10t/m2 aft of moonpool

## System DP

- Manufacturer-Kongsberg Maritime
- Class notation- DP class2, BV, DYNAPOS- AM/AT R
- Reference Systems
- 2 x Hipap 501
- Fanbeam 4.2
- Radius 550x

## Capacities

- Fuel oil 1350 m3
- Fresh water 880 m3
- Ballast water 2851 m3
- MEG tank capacity 425 m3

## Fuel consumption

- Service speed 17,5 t/day (11,5 kts
- Full speed 35,6 t/day (16 kts)
- Manouvering N/A
- On DP (average condition) 8,9 t/day
- Stby at field economical 5,3 t/day
- In port mobilization 2,7 t/da

## Engines & Propulsion

- Total propulsion output- 10500kW
- Azimuth thrusters – 1 x 1500kW
- Bow thrusters - 2 x 1500kW
- Stern thrusters 2 x 3000kw

## Speed

- 16.0 knots (maximum)/ 11.5 knots (Economical)

## Helideck

- Helideck diameter/D-value - 20.9 m
- Maximum takeOff weight - 12.8 Te

## Accommodation

- 100 persons (25 marine crew)
- 39 double and 22 single cabins

## Lifesaving appliances

- Lifeboats - 2 x Jiangyin Wolong JY93C, capacity: 100
- Life rafts - 8 x Viking 25DK+S30, capacity: 25
- Survival Suits – 100 pax

## ROVs

- Olympic Challenger is equipped with two TechnipFMC WROV systems HD 78 and HD 79
- Tether length for HD 78- 1,510m (confirmed 07.2021)
- Tether length for HD 79- 1,471m (confirmed 07.2021)

## Flag I Port

- Norway NIS

## Classification

- I [ HULL [ MACH Supply vessel -heavycargo Unrestricted navigation HEL , COMF-VIB 3 , [ AUT-UMS , CLEANSHIP SUPER , ICE , SDS, DYNAPOS AM/AT R

## Builder/ Year built

- Aker Aukra, 2008(Keel laid 2007)

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## Appendix F: WCD Modeling Report for GC 825 – Previously approved on November 28, 2012 in the Supplemental EP Control Number S-07582

The WCD Modeling Report, included in the MD2 project Initial Exploration Plan Control Number S-07582 approved November 28, 2012, is unaffected by drilling the additional wells. BP does not expect the MD2 WCD Well DC1 Well A to change throughout the project.

# Supplemental Development Operations Coordination Document (SDOCD)

## OCS-G 33859
## Green Canyon 868

## Worst Case Discharge

**The activities proposed in this Supplemental DOCD have been assessed for their WCD potential. These activities in lease OCS-G 33859 Green Canyon Block 868 do not exceed the currently approved WCD for well location GC825 DC1 Well A, previously submitted and approved with the Supplemental EP S-07582 on November 28, 2012.**

# Appendix G: Oil Spill Response Discussion

*SPILL RESPONSE DISCUSSION*

1) Worst Case Discharge Scenario

This project update Supplemental Development Operations Coordination Document (DOCD) is being submitted to add three (3) wells in Green Canyon 868 at previously approved Drill Center 6 in addition to the thirty-five (35) total wells approved in the project Initial DOCDs N-9830 and N-10048.

BP has estimated that its worst case scenario for discharge from a drilling operation may occur from GC 825 DC-1 Well A. Given the anticipated reservoir thickness and historical productivity index the initial worst case discharge is estimated to be 135,000 barrels of crude oil per day. Calculations are based on formulas defined by BSEE regulations.

The well does not result in a change to the worst case oil spill scenario described in the previous Supplemental EP S-07582 and the project Initial DOCDs Control Numbers N-9830 and N-10048, approved on March 5, 2015. The worst case oil spill scenario for this project updated Supplemental DOCD as described in EP S-07582 and DOCDs N-9830/N-10048 and is based upon an uncontrolled blowout with a discharge rate determined in accordance with 30 CFR 254.47(b).

The data and information presented in the following sections 2) – 6) of this Oil Spill Discussion relate to the GC 825 DC1– Well A well covered by this project update Supplemental DOCD, which BP determined was analogous to the well that is covered under the Supplemental EP S-07582.

2) Facility Information:

- Type of Operation: Development
- Facility Name: Mad Dog Phase 2 DC1 Well A
- Area and Block: Green Canyon Block 825
- Latitude: 27° 09' 13.531" N
- Longitude: 090° 18' 35.814" W
- Distance to Shore: 129 statute miles
- Water Depth: 4,939
- API Gravity: 24.5°
- Daily Production Volume: 135,000 barrels

3) Worst Case Discharge Volume

| **Description** | **Barrels of Oil** |
|---|---|
| 24 hour uncontrolled blowout | 135,000 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 17% or approximately 22,950 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 112,050 barrels remaining.

| **Natural Weathering Data: GC 825, DC1 Well A** | **Barrels of Oil** |
|---|---|
| WCD Volume | 135,000 |
| *Less 17*% natural evaporation/dispersion | 22,950 |
| Remaining volume | 112,050 |

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 825 (GC 825) 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 825, DC1 Well A**<br>129 statute miles<br>OCS-G: G09981<br>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:**<br>**Brown pelican, American alligator**<br><br>**Others:**<br>Waterfowl (winter), peregrine falcon, sea birds, shore birds, bass, bream, catfish, crappie, drum, garfish, redfish, speckled trout, flounder, nutria, mink, otter, muskrat, raccoon, white-tailed deer | By boat only. | Delta NWR<br>Bayou Lacombe Centre<br>61389 Hwy 434<br>Lacombe, LA 70445<br>Phone: (985) 882-2000 |
| **Pass A Loutre Wildlife Management Area** | 66,000 acres characterized by river channels with attendant pass banks, natural bayous and man-made canals which are interspersed with intermediate and fresh marshes. Furbearers and alligators are fairly common in the marsh. Freshwater finfish flourish in the interior marsh ponds. | **RTE:**<br>**Brown pelican, American alligator**<br><br>**Others:**<br>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<br>Hammond Field Office<br>42371 Phyllis Ann Drive<br>Hammond, LA 70403<br>Phone (985) 543-4777 |
| **Breton National Wildlife Refuge** | Breton Island and the adjoining Chandeleur Islands. Breton Island is 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:**<br>**Brown pelican, least tern, piping plover**<br><br>**Others:**<br>Redhead ducks and other waterfowl (winter), wading birds, shorebirds and seabirds (including laughing gulls, sandwich terns and black skimmers), finfish | By boat only. Motorized land vehicles are prohibited. | Breton NWR<br>c/o Southeast Louisiana Refuges<br>61389 Highway 434<br>Lacombe, LA 70445<br>Phone : (985) 882-2000 |

Areas of Socio-Economic Concern in Plaquemines Parish:

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

- 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:**<br>**Brown pelican**<br><br>**Others:**<br>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:**<br>**Bald eagle (winter), piping plover (spring-summer)**<br><br>**Others:**<br>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:**<br>**None known**<br><br>**Others:**<br>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:**<br>**American alligator**<br><br>**Others:**<br>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<br>5476 Grand Chenier Hwy<br>Grand Chenier, LA 70643<br>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:**<br>**Bald eagle, brown pelican, Kemp's ridley sea turtle**<br><br>**Others:**<br>Canada goose, white-fronted goose and other waterfowl (winter), peregrine falcon (winter), shrimp, sunfish, bass, spotted sea trout, | Sabine NWR<br>*Physical Location:*<br>3000 Holly Beach Hwy<br>Hackberry, LA 70645<br>Phone: (337) 762-3816<br><br>*Office Address*:<br>1428 Highway 27<br>Bell City, LA 70630<br>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

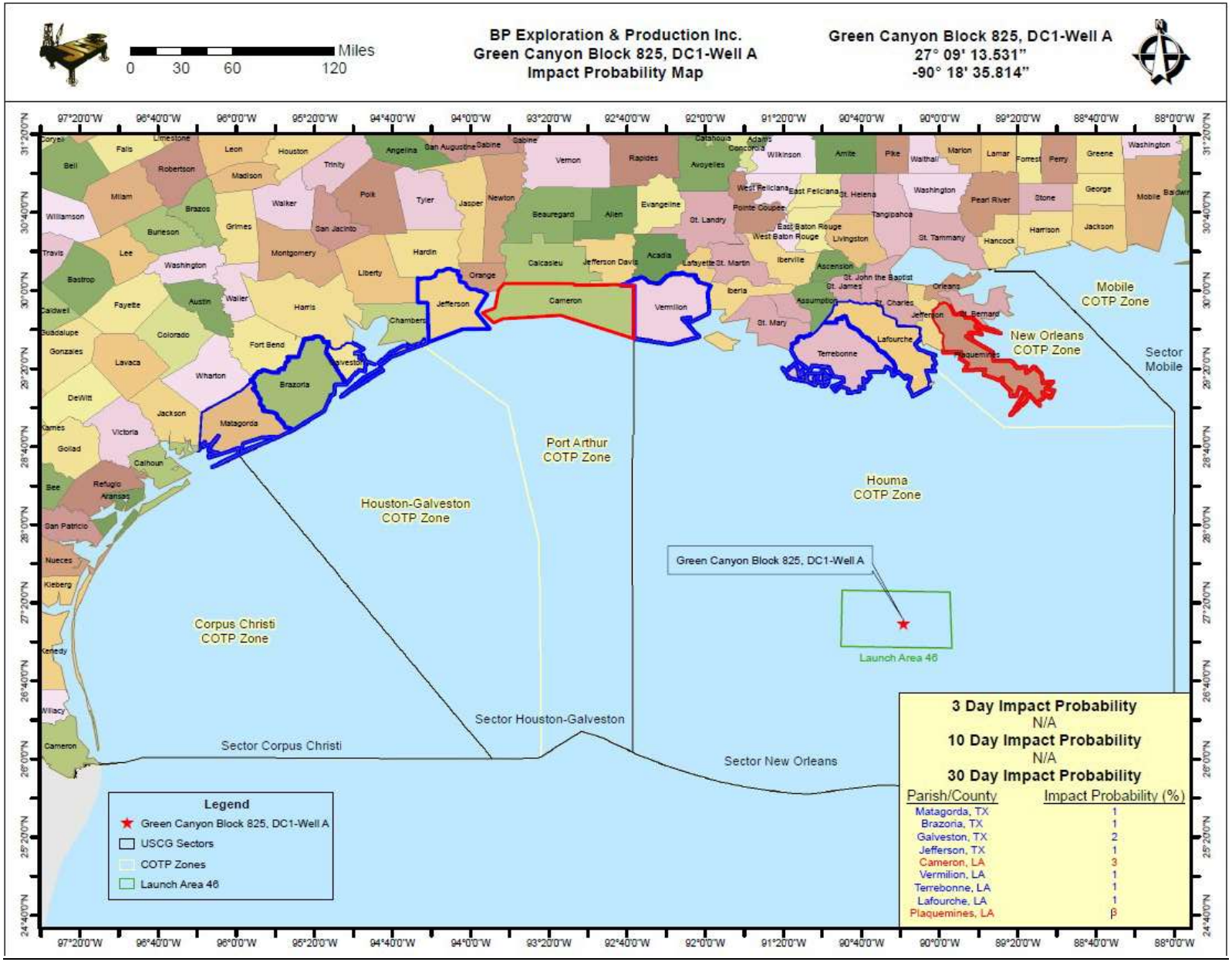
Protection Priorities for Cameron Parish:

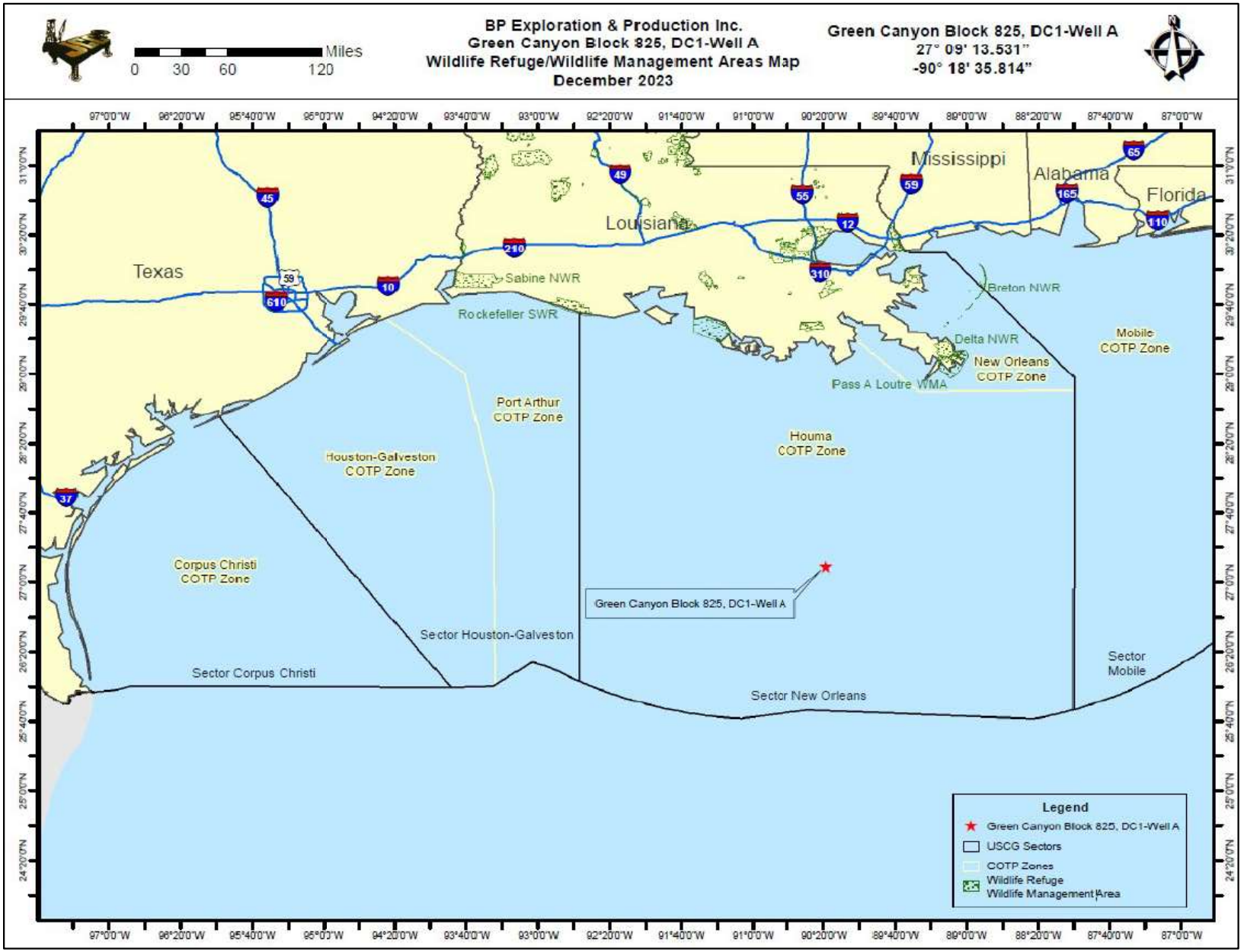
- GSU intake canal
- Rockefeller Wildlife Refuge
- Sabine National Wildlife Refuge
- Other coastal marshlands

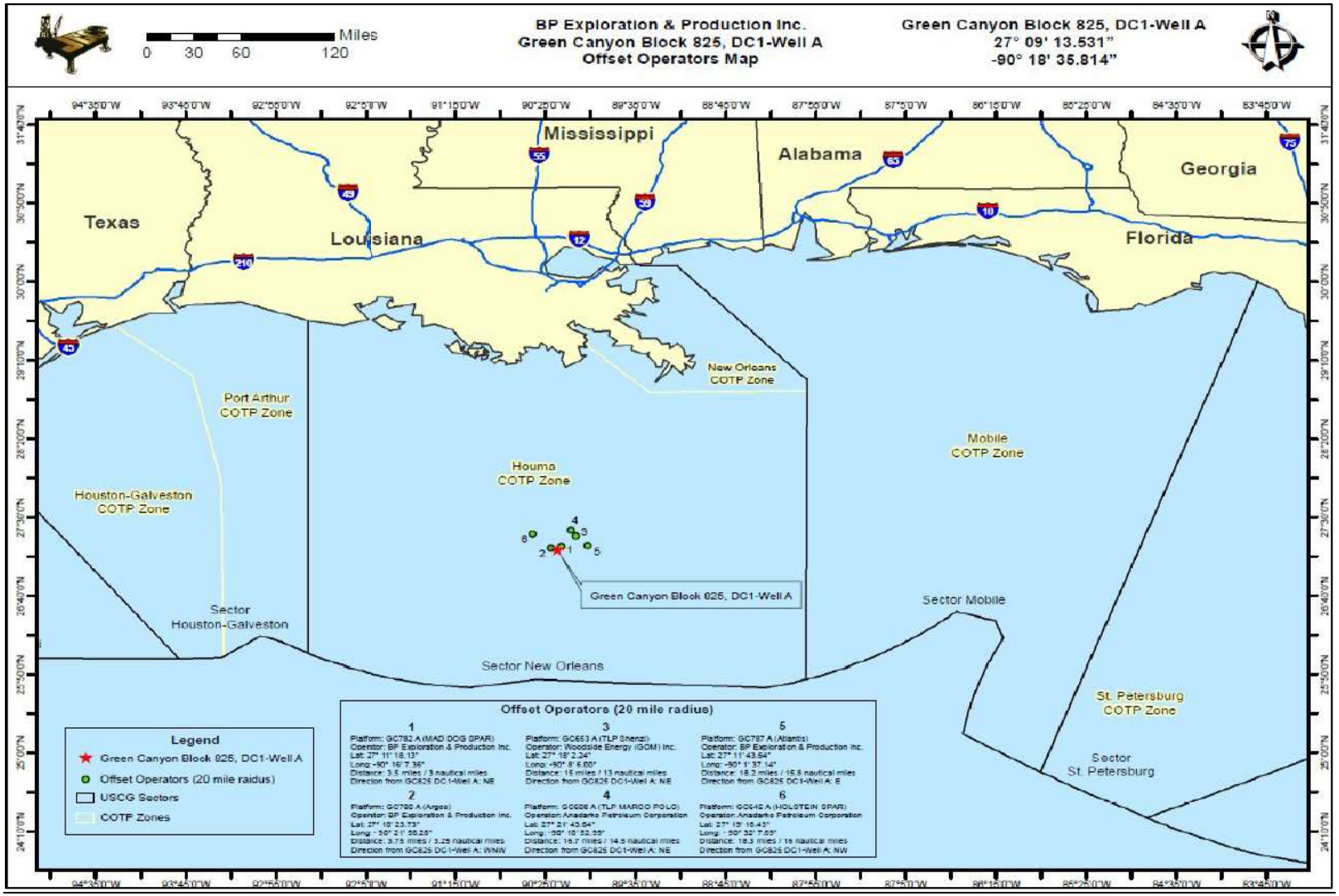
**Figure 3**

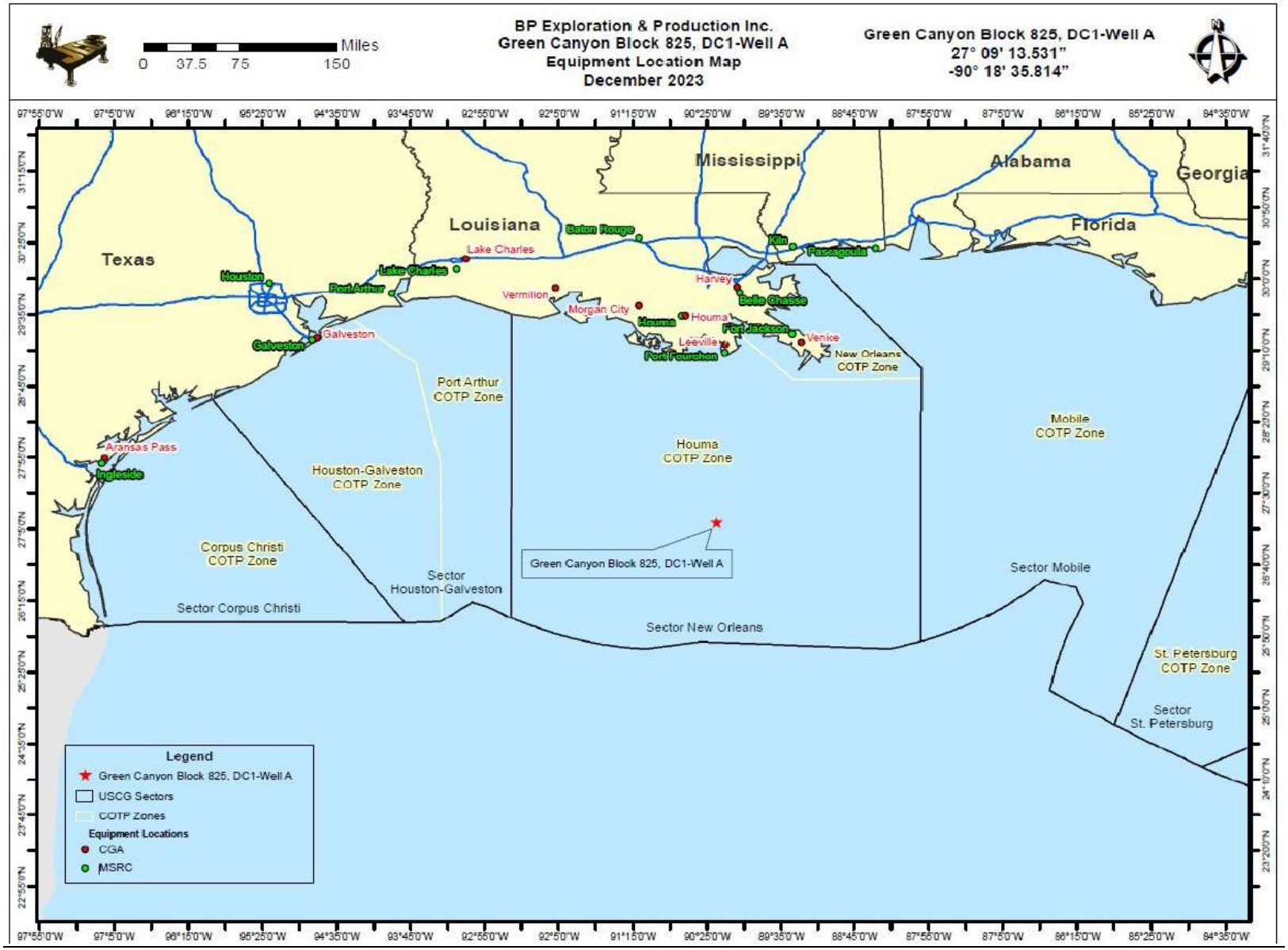
**Cameron Parish and Plaquemines Parish – Shorelines**

| 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. |


Miles
0 30 60 120
BP Exploration & Production Inc.
Green Canyon Block 825, DC1-Well A
Impact Probability Map
Green Canyon Block 825, DC1-Well A
27° 09' 13.531"
-90° 18' 35.814"
Mobile COTP Zone
New Orleans COTP Zone
Sector Mobile
Port Arthur COTP Zone
Houma COTP Zone
Houston-Galveston COTP Zone
Corpus Christi COTP Zone
Green Canyon Block 825, DC1-Well A
Launch Area 46
Sector Houston-Galveston
Sector Corpus Christi
Sector New Orleans
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 β
Legend
Green Canyon Block 825, DC1-Well A
USCG Sectors
COTP Zones
Launch Area 46


Miles
0 30 60 120
BP Exploration & Production Inc.
Green Canyon Block 825, DC1-Well A
Wildlife Refuge/Wildlife Management Areas Map
December 2023
Green Canyon Block 825, DC1-Well A
27° 09' 13.531"
-90° 18' 35.814"
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 825, DC1-Well A
Sector Houston-Galveston
Sector Corpus Christi
Sector New Orleans
Sector Mobile
Legend
Green Canyon Block 825, DC1-Well A
USCG Sectors
COTP Zones
Wildlife Refuge
Wildlife Management Area


Miles
0 30 60 120
BP Exploration & Production Inc.
Green Canyon Block 825, DC1-Well A
Offset Operators Map
Green Canyon Block 825, DC1-Well A
27° 09' 13.531"
-90° 18' 35.814"
Texas
Louisiana
Mississippi
Alabama
Georgia
Florida
Port Arthur COTP Zone
Houston-Galveston COTP Zone
New Orleans COTP Zone
Houma COTP Zone
Mobile COTP Zone
St. Petersburg COTP Zone
Green Canyon Block 825, DC1-Well A
Sector Houston-Galveston
Sector New Orleans
Sector Mobile
Sector St. Petersburg
Legend
Green Canyon Block 825, DC1-Well A
Offset Operators (20 mile raidus)
USCG Sectors
COTP Zones
Offset Operators (20 mile radius)
1
Platform: GC782 A (MAD DOG SPAR)
Operator: BP Exploration & Production Inc.
Lat: 27° 11' 18.13"
Long: -90° 16' 7.56"
Distance: 3.5 miles / 3 nautical miles
Direction from GC825 DC1-Well A: NE
2
Platform: GC700 A (Argos)
Operator: BP Exploration & Production Inc.
Lat: 27° 10' 23.73"
Long: -90° 21' 56.25"
Distance: 3.75 miles / 3.25 nautical miles
Direction from GC825 DC1-Well A: WNW
3
Platform: GC653 A (TLP Shenzi)
Operator: Woodside Energy (GOM) Inc.
Lat: 27° 18' 2.24"
Long: -90° 8' 6.00"
Distance: 15 miles / 13 nautical miles
Direction from GC825 DC1-Well A: NE
4
Platform: GC608 A (TLP MARCO POLO)
Operator: Anadarko Petroleum Corporation
Lat: 27° 21' 43.54"
Long: -90° 10' 52.55"
Distance: 16.7 miles / 14.5 nautical miles
Direction from GC825 DC1-Well A: NE
5
Platform: GC787 A (Atlantis)
Operator: BP Exploration & Production Inc.
Lat: 27° 11' 43.64"
Long: -90° 1' 37.14"
Distance: 18.2 miles / 15.8 nautical miles
Direction from GC825 DC1-Well A: E
6
Platform: GC640 A (HOLSTEIN SPAR)
Operator: Anadarko Petroleum Corporation
Lat: 27° 15' 16.43"
Long: -90° 32' 7.55"
Distance: 18.3 miles / 16 nautical miles
Direction from GC825 DC1-Well A: NW


Miles
0 37.5 75 150
BP Exploration & Production Inc.
Green Canyon Block 825, DC1-Well A
Equipment Location Map
December 2023
Green Canyon Block 825, DC1-Well A
27° 09' 13.531"
-90° 18' 35.814"
Texas
Louisiana
Mississippi
Alabama
Georgia
Florida
Houston
Galveston
Port Arthur
Lake Charles
Baton Rouge
Kiln
Pascagoula
Harvey
Belle Chasse
Vermilion
Morgan City
Houma
Fort Jackson
Venice
Leeville
Port Fourchon
New Orleans
Aransas Pass
Ingleside
Port Arthur COTP Zone
Houston-Galveston COTP Zone
Houma COTP Zone
Mobile COTP Zone
Corpus Christi COTP Zone
Green Canyon Block 825, DC1-Well A
Sector Houston-Galveston
Sector Corpus Christi
Sector New Orleans
Sector Mobile
St. Petersburg COTP Zone
Sector St. Petersburg
Legend
Green Canyon Block 825, DC1-Well A
USCG Sectors
COTP Zones
Equipment Locations
CGA
MSRC

5) General Considerations for all Oil Spill Recovery Operations

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 Operating Picture (COP).

6) Location Specific Worst Case Discharge Response

BP's Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If the conditions are favorable for dispersant application and/or in-situ burning, once the proper approvals have been obtained and the proper planning is in place, dispersant application and/or in-situ burning of oil may be employed. Slick containment boom will be immediately called out and on scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA and MSRC spill response equipment, with a total derated skimming capacity of 529,704 barrels. Temporary storage associated with skimming equipment equals 209,696 barrels. If additional storage is needed, various storage barges with a total capacity of 1,308,000+ 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 284,528 barrels. Temporary storage associated with skimming equipment equals 9,973 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 75 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<br>Visibility less than 3 nautical miles<br>Ceiling less than 1,000 feet. |
| FRU | 8 foot seas |
| HOSS Barge/OSRB | 8 foot seas |
| Koseq Arms | 8 foot seas |
| OSRV | 4 foot seas |

9) Environmental Conditions in the GOM

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

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

The Atlantic and Gulf of Mexico hurricane season is officially from 1 June to 30 November. 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 every 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– <u>BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS</u> (129 statute miles from shore)**
112,050 bbls of crude oil (Volume considering natural weathering, based on 24-hour estimate)
API Gravity 24.5°

**FIGURE 4 – Equipment Response Time to GC 825 DC1 Well A**

*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 | Vermilion | 2 | 0 | 2 | 9 | 1 | 14 |
| 95' FRV | 22885 | 249 | NA | 6 | Galveston | 2 | 0 | 2 | 13 | 1 | 18 |
| Boom Barge (CGA-300)<br>42" Auto Boom (25000') | NA | NA | 1 Tug<br>50 Crew | 4 (Barge)<br>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 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<br>1 Transrec 350 2,640' 67"<br>Curtain Pressure Boom | 10567 | 4000 | NA | 11 | Fort Jackson, LA | 2 | 1 | 4 | 9 | 1 | 17 |
| MSRC 401 Offshore Barge<br>1 Crucial Disk 88/30 2,640' 67"<br>Curtain Pressure Boom | 11122 | 40000 | 3 Tugs | 9 | Fort Jackson, LA | 4 | 1 | 6 | 18 | 1 | 30 |
| S.T. Benz Responder<br>1 LFF 100 Brush<br>2,640' 67" Curtain Pressure Boom | 18086 | 4000 | NA | 11 | Grand Isle, LA | 3 | 1 | 1 | 10 | 1 | 16 |
| Mississippi Responder<br>1 Transrec 350<br>2,640' 67" Curtain Pressure Boom | 10567 | 4000 | NA | 11 | Pascagoula, MS | 2 | 1 | 2 | 17 | 1 | 23 |
| MSRC 402 Offshore Barge<br>1 Crucial Disk 88/30<br>2,640' 67" Curtain Pressure Boom | 11122 | 40300 | 3 Tugs | 9 | Pascagoula, MS | 4 | 1 | 3 | 30 | 1 | 39 |
| Gulf Coast Responder<br>1 Transrec 350<br>*2,640' 67" Curtain Pressure Boom* | 10567 | 4000 | NA | 11 | Lake Charles, LA | 2 | 1 | 4 | 18 | 1 | 26 |
| Texas Responder<br>1 Transrec 350<br>*2,640' 67" Curtain Pressure Boom* | 10567 | 4000 | NA | 11 | Galveston, TX | 2 | 1 | 1 | 21 | 1 | 26 |
| MSRC 570 Offshore Barge<br>1 Crucial Disk 88/30<br>*2,640' 67" Curtain Pressure Boom* | 11122 | 56900 | 3 Tugs | 9 | Galveston, TX | 4 | 1 | 2 | 40 | 1 | 48 |

| 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 |
| CTCo 2609 | NA | 23000 | 1 Tug | 6 | Amelia | 17 | 0 | 6 | 24 | 1 | 48 |
| CTCo 5001 | NA | 47000 | 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 | 110000+ | 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 | 140000+ | 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 |
| Koseq Skimming Arms (2)<br>Lamor brush | 45770 | 12000 | 2 OSV | 12 | Harvey | 24 | 24 | 3 | 10 | 2 | 62 |
| Koseq Skimming Arms (4)<br>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 | 25 | 1 | 45 |
| FRU (1) + 100 bbl Tank (2) | 4251 | 200 | 1 Utility | 6 | Aransas Pass | 2 | 5 | 16.5 | 27 | 1 | 51.5 |
| FRU (1) + 100 bbl Tank (2) | 4251 | 200 | 1 Utility | 6 | Lake Charles | 2 | 5 | 7 | 20 | 1 | 35 |

**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)<br>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)<br>1,320' 67" Curtain Pressure Boom | 11122 | 1000 | 1 PSV | 9 | Fort Jackson | 1 | 1 | 5 | 10 | 1 | 18 |
| Crucial Disk 88/30 Skimmer (1)<br>1,320' 67" Curtain Pressure Boom | 11122 | 1000 | 1 PSV | 9 | Fort Jackson | 1 | 1 | 5 | 10 | 1 | 18 |

**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<br>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 | Lake Charles | 1 | 1 | 7 | 2 | 1 | 12 |
| AardVac Skimmer (1) | 3840 | 500 | 1 Utility | 5 | Pascagoula | 1 | 1 | 6 | 2 | 1 | 11 |
| 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 |
| WP 1 Skimmer (1) | 3017 | 500 | 1 Utility | 5 | Pascagoula | 1 | 1 | 6 | 2 | 1 | 11 |
| 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 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 |
| 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 |
| Queensboro Skimmer (1) | 905 | 400 | 1 Utility | 4 | Miami | 1 | 1 | 5.5 | 2 | 1 | 10.5 |

*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 | 529,704 |
| Offshore Recovered Oil Storage | 1,517,696+ |
| Nearshore / Shallow Water EDRC | 284,528 |
| Nearshore / Shallow Water Recovered Oil Storage | 765,973+ |

*References*

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

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

# Coastal Zone Management Consistency Certification
# State of Alabama

Supplemental Development Operations Coordination Document
Type of OCS Plan

Green Canyon Block 868
Area and Block

OCS-G 33859
Lease Number

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

BP Exploration & Production Inc.
Lessee or Operator

DocuSigned by:
55BB7A3EC4BA4C5...
Certifying Official

December 21, 2023
Date

# Evaluation of Consistency with Alabama Enforceable Policies

## 1 Background

BP Exploration & Production Inc. (bp) is submitting a Supplemental Development Operations Coordination Document (DOCD) to the Bureau of Ocean Energy management (BOEM) for Green Canyon (GC) Block 868 (GC 868), Gulf of Mexico, Outer Continental Shelf (OCS)- G 33859. Under the DOCD, bp proposes to drill and complete three wells with surface hole locations in GC 868; the DOCD also includes installation of associated subsea infrastructure including jumpers, manifolds, and suction piles.

This regulatory analysis and consistency determination evaluates bp's DOCD for any reasonably foreseeable coastal effects on the land, water uses, or natural resources of the coastal zone of Alabama, pursuant to the enforceable policies of the Alabama Coastal Area Management Program (ACAMP). The analysis is submitted pursuant to 15 Code of Federal Regulations (CFR) 930.76 and is supported by documentation provided in the accompanying Environmental Impact Analysis (EIA) prepared in accordance with applicable regulations, including 30 CFR 550.242(s) and 550.261 as well as Notice to Lessees and Operators (NTL) 2008-G04, extended by NTL 2015-N02, and NTL 2015-N01.

GC 868 is located within the Central Gulf of Mexico Outer Continental Shelf (OCS) Planning Area, approximately 246 statute miles (396 km) from the nearest Alabama shoreline. bp does not expect the proposed activities to affect the State of Alabama. The proposed activities will be conducted in accordance with the regulations of BOEM, the Bureau of Safety and Environmental Enforcement, and the U.S. Environmental Protection Agency, as well as applicable NTLs, conditions in the approved permits, and lease stipulations.

Spill response-related activities for the proposed activities under bp's DOCD are governed by the bp Regional Oil Spill Response Plan (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 on 30 May 2023. bp (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in the DOCD, according to 30 CFR Part 553 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

As discussed in Section A.9.2 of the EIA (Large Oil Spill [Worst Case Discharge]), the trajectory of a hypothetical spill in GC 868, projected using information in the 30-day Oil Spill Risk Analysis model for the Gulf of Mexico (see Ji et al., 2004), indicates there is a <0.5 % conditional probability of a spill contacting Mobile or Baldwin counties, Alabama within 30 days of a spill. Using Launch Point 46 (as indicated in Ji et al., 2004), the model predicts potential shoreline contact within 30 days of a spill ranging from Matagorda County, Texas to Plaquemines Parish, Louisiana.

## 2 Evaluation

**Table 1** evaluates the proposed activities with respect to the enforceable policies of the ACAMP according to 15 CFR 930 Subpart E. The ACAMP was approved and has been in effect since 1979 (National Oceanic and Atmospheric Administration and Alabama Coastal Area Board, 1979), and was most recently updated in 2017 (Alabama Department of Conservation & Natural Resources, 2017). Its purpose is to promote, improve, and safeguard the lands and waters located in Alabama's coastal area through a comprehensive and cooperative program designed to preserve, enhance, and develop these

valuable resources for present and future generations. The enforceable policies of the program regulate various activities on coastal lands and waters in Baldwin and Mobile Counties of Alabama.

# 3 Consistency Certification

The analysis indicates that bp's DOCD for GC 868 is consistent with the guidelines and policies provided by the ACAMP. Routine operations will have limited environmental impacts in the project area. All land-based support activities, including transport to and from the site, are expected to be from Louisiana.

Table 1. Evaluation of the Supplemental Development Operations Coordination Document (DOCD) for Green Canyon Block 868 relative to the enforceable policies of the Alabama Coastal Area Management Program (ACAMP).

| Policy | Cross Reference to the DOCD | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Coastal Resource Use Policies | | | |
| Coastal Development | DOCD Section 1 – Plan Contents | Routine activities are not anticipated to affect Alabama's coastal development. The proposed activities will occur in Federal Outer Continental Shelf (OCS) waters approximately 246 statute miles (396 km) from the nearest Alabama shoreline, and bp will use existing onshore support facilities in Louisiana. No impacts on coastal development are expected. | Yes |
| Mineral Resource Exploration and Extraction | DOCD Section 1 – Plan Contents | Routine activities are not anticipated to affect mineral resource exploration and extraction in Alabama's coastal zone. The proposed activities will occur in Federal OCS waters approximately 246 statute miles (396 km) from the nearest Alabama shoreline and do not include any extraction of minerals from the Alabama coastal zone. | Yes |
| Commercial Fishing | DOCD Appendix I – EIA (C.8.1 Recreational and Commercial Fishing) | Routine activities are not anticipated to affect commercial fishing in Alabama's coastal zone. Routine activities may have limited environmental impacts in Federal OCS waters, approximately 246 statute miles (396 km) from the nearest Alabama shoreline.<br>Pelagic longlining activities in the lease area and other commercial fishing activities in the northern Gulf of Mexico, including Alabama's coastal zone, could be interrupted in the event of a large oil spill. A spill may or may not result in fishery closures depending on the duration of the spill, the oceanographic and meteorological conditions at the time, and the effectiveness of spill response measures. The potential impacts of an oil spill on the northern Gulf of Mexico coast are analyzed in the EIA. In the event of a spill, bp will implement the plans and procedures of its Regional Oil Spill Response Plan (ROSRP). The precautions addressed in bp's standard safety and environmental operating procedures and ROSRP are consistent with the protection of Alabama's fishery resources and commercial fishing industry. | Yes |

Table 1. (Continued).

| Policy | Cross Reference to the DOCD | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Hazard Management | DOCD Section 3 – Geological and Geophysical Information<br>DOCD Section 9 – Oil Spill Information<br>DOCD Appendix I – EIA (D. Environmental Hazards) | Site clearance surveys indicated seafloor conditions are suitable for proposed activities.<br>Routine activities are not anticipated to increase the susceptibility of the Alabama's coastal zone to natural hazards due to the location of the proposed activities in Federal OCS waters, approximately 246 statute miles (396 km) from the nearest Alabama shoreline. No new development in coastal areas, construction, dredging, or filling on Alabama's lands or waters are anticipated.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize shoreline erosion. | Yes |
| Shoreline Erosion | DOCD Appendix I – EIA (C.7 Coastal Habitats and Protected Areas) | Routine activities are not anticipated to affect Alabama's shoreline due to the location of the proposed activities in Federal OCS waters, approximately 246 statute miles (396 km) from the nearest Alabama shoreline. No new development in coastal areas, construction, dredging, or filling on Alabama's lands or waters are anticipated that could cause shoreline erosion.<br>In the event of a spill, any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize shoreline erosion. | Yes |
| Recreation | DOCD Section 9 – Oil Spill Information<br>DOCD Appendix I – EIA (C.8.4 Recreation and Tourism) | There will be no routine activities in the Alabama coastal zone that could interfere with or diminish public access to coastal lands and waters for recreation. Recreational resources and tourism in coastal areas would not be affected by any routine activities due to the distance from shore. There are no known recreational uses of the project area. bp operations has a marine trash and debris program; additionally, compliance with NTL 2015-G03 will minimize the chance of trash or debris being lost overboard and subsequently washing up on beaches.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. The precautions addressed in bp's standard safety and environmental operating procedures and its ROSRP are consistent with the ACAMP policy of safeguarding public access to coastal lands and waters for recreation. | Yes |
| Transportation | DOCD Section 11 – Lease Stipulations<br>DOCD Appendix I – EIA (C.8.6 Other Marine Uses) | Routine activities are not anticipated to affect transportation. The lease area is not located within any United States Coast Guard-designated fairway or shipping lane, or within any Military Warning Area. bp will comply with the Bureau of Ocean Energy Management requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft. No impacts on Alabama transportation routes or infrastructure are expected to occur. | Yes |

Table 1. (Continued).

| Policy | Cross Reference to the DOCD | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Natural Resource Protection Policies | | | |
| Biological Productivity | DOCD Section 7 – Waste and Discharge Information<br>DOCD Section 9 – Oil Spill Information<br>DOCD Appendix I – (C.7 Coastal Habitats and Protected Areas) | Routine activities are not anticipated to affect biologically productive coastal habitats, including estuaries. The proposed activities will be conducted in Federal OCS waters approximately 246 statute miles (396 km) from the nearest Alabama shoreline. In the event of a spill, bp will implement the plans and procedures of its ROSRP. The precautions addressed in bp's standard safety and environmental operating procedures and its ROSRP are consistent with the ACAMP policy of protecting and preserving biologically productive coastal habitats. | Yes |
| Water Quality and Water Resources | DOCD Section 9 – Oil Spill Information<br>DOCD Appendix I – EIA (C.1.2 Water Quality) | Routine activities are not anticipated to affect Alabama's coastal water quality or water resources. The proposed activities will be conducted in Federal OCS waters, approximately 246 statute miles (396 km) from the nearest Alabama shoreline. All discharges for the proposed activity will be governed by a National Pollutant Discharge Elimination System General Permit. The authorized overboard discharges during the proposed activities will be localized in offshore waters and are not expected to affect Alabama's water quality or water resources. bp will be using onshore support facilities in Louisiana.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. The precautions addressed in bp's standard safety and environmental operating procedures and its ROSRP are consistent with the core policies of conserving water quality and water resources for full beneficial use. | Yes |
| Air Quality | DOCD Section 8 – Air Emissions Information<br>DOCD Appendix I – EIA (C.1.1 Air Quality) | Routine activities are not anticipated to affect Alabama's coastal air quality. The proposed activities will be conducted in Federal OCS waters, approximately 246 statute miles (396 km) from the nearest Alabama shoreline.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. The precautions addressed in bp's standard safety and environmental operating procedures and its ROSRP are consistent with the protection of coastal air quality. | Yes |
| Wetlands and Submerged Grassbeds | DOCD Section 6 – Biological, Physical, and Socioeconomic Information<br>DOCD Section 9 – Oil Spill Information<br>DOCD Appendix I – EIA (C.7 Coastal Habitats and Protected Areas) | Routine activities are not anticipated to affect Alabama's wetlands and endemic submerged aquatic vegetation. The proposed activities will be conducted in Federal OCS waters approximately 246 statute miles (396 km) from the nearest Alabama shoreline. There will be no new construction, dredging, or filling on Alabama's lands or waters that could affect wetlands or submerged seagrass beds.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts on wetlands, seagrass beds, and other coastal habitats. | Yes |

Table 1. (Continued).

| Policy | Cross Reference to the DOCD | Comments | Consistent with ACAMP Policies? (Yes/No) |
|---|---|---|---|
| Beach and Dune Protection | DOCD Section 6 – Biological, Physical, and Socioeconomic Information<br>DOCD Section 9 – Oil Spill Information<br>DOCD Appendix I – EIA (C.7 Coastal Habitats and Protected Areas) | Routine activities are not anticipated to affect Alabama's beaches and dunes. The proposed activities will be conducted in Federal OCS waters approximately 246 statute miles (396 km) from the nearest Alabama shoreline. There will be no new construction, dredging, or filling on Alabama's lands or waters that could weaken, damage, or destroy the integrity of the coastal areas or cause erosion of beaches or dunes.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize shoreline erosion and impacts on beach and dune systems. | Yes |
| Wildlife Habitat Protection | DOCD Section 6 – Biological, Physical, and Socioeconomic Information<br>DOCD Section 9 – Oil Spill Information<br>DOCD Appendix I – EIA (C.3 Threatened, Endangered, and Protected Species and Critical Habitat; and C.7 Coastal Habitats and Protected Areas) | Routine activities are not anticipated to affect Alabama's wildlife habitat. The proposed activities will be conducted in Federal OCS waters approximately 246 statute miles (396 km) from the nearest Alabama shoreline. There will be no new construction, dredging, or filling on Alabama's lands or waters that could affect coastal wildlife habitats, including critical habitats for endangered or threatened species.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts on wildlife habitats. | Yes |
| Endangered Species | DOCD Section 6 – Biological, Physical, and Socioeconomic Information<br>DOCD Section 9 – Oil Spill Information<br>DOCD Section 10 – Environmental Monitoring and Mitigation Measures<br>DOCD Appendix I – EIA (C.3 Threatened, Endangered, and Protected Species and Critical Habitat) | Routine activities are not anticipated to affect Alabama's endangered species. The proposed activities will be conducted in Federal OCS waters approximately 246 statute miles (396 km) from the nearest Alabama shoreline. There will be no new construction, dredging, or filling on Alabama's lands or waters that could affect endangered or threatened species or their coastal wildlife habitats.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts on endangered and threatened species and their habitats. | Yes |
| Cultural Resources Protection | DOCD Section 6 – Biological, Physical, and Socioeconomic Information<br>DOCD Section 9 – Oil Spill Information<br>DOCD Appendix I – EIA (C.6 Archaeological Resources) | Routine activities are not anticipated to affect Alabama's cultural resources located within the coastal zone. The proposed activities will be conducted in Federal OCS waters approximately 246 statute miles (396 km) from the nearest Alabama shoreline. bp does not anticipate the proposed activities will affect any sunken or abandoned ships or objects of historical or archaeological value located on Alabama lands or waters.<br>In the event of a spill, bp will implement the plans and procedures of its ROSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts to sensitive cultural resources. | Yes |

EIA = Environmental Impact Analysis; DOCD = Development Operations Coordination Document.

# 4 References Cited

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

Ji, Z.-G., W.R. Johnson, C.F. Marshall, and E.M. Lear. 2004. Oil-Spill Risk Analysis: Contingency Planning Statistics for Gulf of Mexico OCS Activities. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Report MMS 2004-026. 62 pp.

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

# Coastal Zone Management Consistency Certification
# State of Louisiana

Supplemental Development Operations Coordination Document
Type of OCS Plan

Green Canyon Block 868
Area and Block

OCS-G 33859
Lease Number

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

BP Exploration & Production Inc.
Lessee or Operator

DocuSigned by:
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Certifying Official

December 21, 2023
Date

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

## 1 Background

BP Exploration & Production Inc. (bp) is submitting a Supplemental Development Operations and Coordination Document (DOCD) for Green Canyon (GC) Block 868 (GC 868), Gulf of Mexico, Outer Continental Shelf (OCS)-G 33859. Under this DOCD, bp proposes to drill three production wells that will tie-in to the existing DC6 drill center in GC 868. The proposed project also includes installation of subsea infrastructure, including jumpers, manifolds, and suction piles.

This document evaluates bp's DOCD for any reasonably foreseeable coastal effects on the land, water uses, or natural resources of the coastal zone of Louisiana, and evaluates the consistency of bp's DOCD with the enforceable policies of the Louisiana Coastal Resource Program (LCRP). The analysis, compliant with the Coastal Zone Management Act, is submitted pursuant to 15 Code of Federal Regulations (CFR) 930.76 and is supported by documentation provided in the Environmental Impact Analysis (EIA). The EIA provides an environmental impacts analysis for the drilling and subsea installation activities based on the location in GC 868 and is included in DOCD Appendix I. The EIA was prepared in accordance with applicable regulations, including 30 CFR 550.242 and 550.261 as well as Notice to Lessees and Operators (NTL) 2008-G04, extended by NTL BOEM 2015-N02, and BOEM 2015-N01.

The proposed activities will be conducted in accordance with BOEM, Bureau of Safety and Environmental Enforcement (BSEE), and U.S. Environmental Protection Agency regulations, applicable NTLs, conditions in the approved permits, and lease stipulations. Required federal permits will be obtained, and activities are expected to be conducted in compliance with such regulations, NTLs, conditions, and stipulations.

The proposed activities will occur in Federal OCS waters, approximately 134 statute miles (216 km) from the nearest Louisiana shoreline (**Figure 1**). A dynamically positioned semisubmersible or drillship is anticipated to be on site for approximately 123 days in 2024 going into 2025 for well drilling and completion activities associated with well DC6-C, and 115 days each beginning in 2025 and possibly going into 2026 for well drilling and completion activities associated with wells DC6-D and DC6-E. An installation vessel is anticipated to be on site for approximately 200 days for subsea infrastructure installation.

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

Spill response-related activities for the proposed activities under bp's DOCD are governed by the bp Regional Oil Spill Response Plan (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 BSEE on 30 May 2023. bp (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in the DOCD, according to 30 CFR Part 553 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

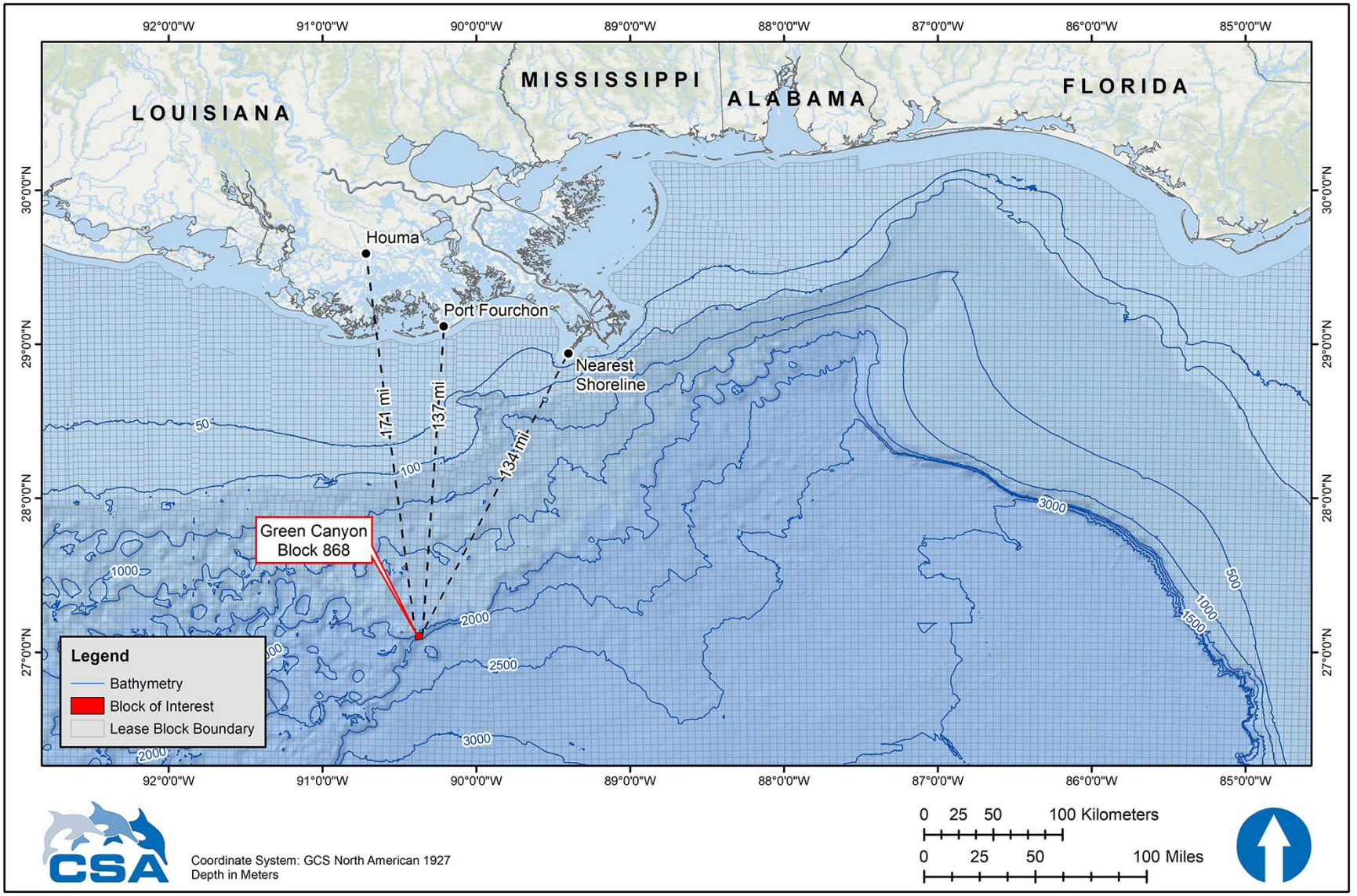


Figure 1. Location of Green Canyon Block 868 relative to the Louisiana shoreline and offshore bathymetric contours.

As discussed in Section A.9.2 of the EIA (Large Oil Spill [Worst Case Discharge]), the trajectory of a hypothetical spill in GC 868, projected using information in the 30-day Oil Spill Risk Analysis model for the Gulf of Mexico (see Ji et al., 2004), indicates there is up to a 3% conditional probability of a spill contacting the Louisiana shoreline (Cameron or Plaquemines Parish) within 30 days of a spill. Using Launch Point 46 (as indicated in Ji et al., 2004), the model predicts potential shoreline contact within 30 days of a spill ranging from Matagorda County, Texas to Plaquemines Parish, Louisiana.

# 2 Louisiana Coastal Resource Program Guidelines

Pursuant to the Louisiana State and Local Resources Management Act of 1978, as amended (Act 361, La. R.S. 49:214.21 et seq.), the Office of Coastal Management of the Louisiana Department of Natural Resources has created guidelines to implement the LCRP (LAC 43:I.Chapter 7). The guidelines are organized as a set of performance standards that are used to evaluate the impacts of a proposed action on coastal resources. All guidelines applicable to bp's proposed project in GC 868 are summarized in the following sections.

## §701. Guidelines Applicable to All Uses

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

The guidelines have been read in their entirety in preparation of this consistency analysis for the GC 868 project, and bp expects to comply with all applicable guidelines.

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

Addressed in DOCD Sections 7 and 8 and Appendix I.

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

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

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

1. *type, nature, and location of use;*
2. *elevation, soil, and water conditions and flood and storm hazard characteristics of site;*
3. *techniques and materials used in construction, operation, and maintenance of use;*
4. *existing drainage patterns and water regimes of surrounding area including flow, circulation, quality, quantity, and salinity; and impacts on them;*

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

    Addressed in DOCD Sections 1, 6, and 10, and Appendix I.

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

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

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

    Addressed in DOCD Sections 6 and 7, and Appendix I.

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

Addressed in DOCD Sections 1 and 2.

## §703. Guidelines for Levees

Not applicable.

## §705. Guidelines for Linear Facilities

Not applicable.

## §707. Guidelines for Dredged Spoil Deposition

Not applicable.

## §709. Guidelines for Shoreline Modification

Not applicable.

## §711. Guidelines for Surface Alterations

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

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

Not applicable.

## §715. Guidelines for Disposal of Wastes

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

Addressed in DOCD Sections 7 and 14, and Appendices D and I.

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

Addressed in DOCD Sections 7 and 14, and Appendices D and I.

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

Not applicable.

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

Not applicable.

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

Not applicable.

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

Not applicable.

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

Not applicable.

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

Addressed in DOCD Sections 7 and 14, and Appendices D and I.

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

Radioactive wastes may be generated during the completion phase of the project and are addressed in DOCD Sections 7 and 14, and Appendix D.

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

Not applicable.

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

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

Not applicable; all geophysical survey work related to this project was conducted on the OCS in GC 868, approximately 134 statute miles (216 km) from the nearest Louisiana shoreline. Geological and geophysical information is provided in DOCD Section 3.

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

Not applicable; all drilling activities related to this project will be conducted on the OCS in GC 868, approximately 134 statute miles (216 km) from the nearest Louisiana shoreline.

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

Addressed in DOCD Sections 1, 6, and 10, and Appendix I. No activities will be conducted in wildlife preserves or management areas. All drilling activities related to this project will be conducted on the OCS in GC 868. Shore-based support will originate from Louisiana. The nearest Louisiana shoreline is approximately 134 statute miles (216 km) from the project area.

During a large-scale incident, a few of Louisiana's Wildlife Refuges, Wilderness Areas, State Parks, and other protected areas that could potentially be affected by oiling within 30 days of a large spill (per the 30-day Oil Spill Risk Analysis presented by Ji et al., 2004). Potentially affected areas, along with the natural resources found in each area, are provided in **Table 1**.

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

Not applicable; all drilling activities related to this project will be conducted on the OCS in GC 868, approximately 134 statute miles (216 km) from the nearest Louisiana shoreline.

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

Addressed in DOCD Sections 13 and 14, and Appendix I.

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

Addressed in DOCD Sections 1, 2, 9, and 10.

Table 1. Louisiana Wildlife Refuges, Wilderness Areas, State Parks, and other protected areas and natural resources within the geographic range of potential shoreline oil contact within 30 days of a large discharge event based on Oil Spill Risk Analysis Launch Point 46 (as referenced from Ji et al., 2004).

| Wildlife Refuge, Wilderness Area, State or National Park | Resource Description |
|---|---|
| Cameron Parish | |
| Lacassine National Wildlife Refuge (NWR) | Established in 1937, Lacassine NWR is approximately 35,000 acres of freshwater marsh. Approximately half of the acreage of the NWR is natural freshwater marsh and open water. Notable wildlife includes nesting colonies of wading and water birds, alligators, eagles, falcons, and Louisiana black bears as well as wintering populations of several species of ducks. The NWR is known for vast numbers of pintails congregating each winter. The NWR is available for a multitude of recreational opportunities, including fishing, hunting, boating, and hiking (U.S. Fish and Wildlife Service [USFWS], n.d. - 1). |
| Peveto Woods Bird and Wildlife Sanctuary | A bird sanctuary owned by the Baton Rouge Audubon Society; this sanctuary is a 40-acre tract of coastal land in Cameron Parish. During the spring and fall migrations, the sanctuary is home to numerous species of songbirds. It is estimated that nearly 2 million birds seek refuge in the sanctuary each year before and after their trans-Gulf migrations. The sanctuary is also used by numerous species of butterflies, including the migratory Monarch butterfly (Baton Rouge Audubon Society, 2022). |
| Rockefeller Wildlife Refuge and Game Preserve | Rockefeller Wildlife Refuge, located in eastern Cameron and western Vermilion Parishes, is owned, and maintained by the State of Louisiana. The refuge is a flat, treeless area with highly organic soils that are capable of producing immense quantities of waterfowl foods in the form of annual emergent and submerged aquatics. When deeded to the state, the refuge encompassed approximately 86,000 acres, but beach erosion has taken a heavy toll, and the most recent surveys indicate only 76,042 acres remain. This area borders the Gulf of Mexico for 26.5 miles and extends inland toward the Grand Chenier Ridge, a stranded beach ridge 6 miles (10 km) from the Gulf of Mexico. Common resident animals include Mottled Ducks, nutria, muskrat, rails, raccoon, mink, otter, opossum, white-tailed deer, and alligators. An abundant fisheries population provides recreational opportunities to fishermen seeking shrimp, redfish, speckled trout, black drum, and largemouth bass, among others (Louisiana Department of Wildlife and Fisheries, n.d. – a). |

Table 1. (Continued).

| Wildlife Refuge, Wilderness Area, State or National Park | Resource Description |
|---|---|
| Sabine NWR | Sabine NWR includes 124,511 acres of fresh, intermediate, and brackish marshes that provide habitat for waterfowl and other birds. Designated as an Internationally Important Bird Area, the refuge is known to provide habitat for more than 300 species of birds, 26 species of mammals, 41 species of reptiles and amphibians, 132 species of fish, and 68 species of marine invertebrates. Common bird species include Mottled Ducks, Great Egrets, Neotropic Cormorants, Snowy Egrets, and various species of wading birds and shorebirds. American alligators are known to be very common in the refuge as well (USFWS, n.d. - b). |
| Vermilion Parish | |
| Paul J. Rainey Wildlife Refuge and Game Preserve | Paul J. Rainey Wildlife Refuge and Game Preserve is a privately owned 26,000-acre coastal wetland in Vermilion Parish owned by the National Audubon Society. Formerly open to gas drilling, hydrocarbon exploration ended in 1999. Notable faunae include deer, muskrats, otters, geese, and numerous other species of birds. No hunting or fishing is currently allowed in the Preserve (National Audubon Society, n.d.). |
| Rockefeller Wildlife Refuge and Game Preserve | See description under Cameron Parish. |
| State Wildlife Refuge | State Wildlife Refuge is a 13,000-acre tract owned by the State of Louisiana. Located on the southwest shore of Vermilion Bay, the focus of the refuge is on natural resource conservation. The refuge is an important waterfowl wintering area and serves as habitat for numerous species of shorebirds, wading birds, alligators, shrimp, fish, and crabs. Mammals such as raccoons, muskrats, nutria, mink, and deer are common as well (Louisiana Department of Wildlife and Fisheries, n.d. – b). |
| Terrebonne Parish | |
| Isle Dernieres Barrier Islands Refuge | This refuge is made up of three barrier islands offshore of Terrebonne Parish: Wine Island, Whiskey Island, and Raccoon Island, for a total of approximately 630 acres. The primary management goal of the refuge is to provide and protect habitat for nesting waterbirds. Raccoon Island is one of the most important waterbird nesting sites on the Gulf coast (Louisiana Department of Wildlife and Fisheries, n.d. – c). |
| Mandalay NWR | Mandalay NWR was established in 1996 as 4,419 acres of freshwater marsh and cypress-tupelo swamp. Access to the refuge is by boat only. Popular activities in the refuge include wildlife observation, boating, fishing, and hunting. The refuge proves important habitat for wintering waterfowl of the Mississippi flyway. Other notable wildlife includes ducks, white tailed deer, alligators, and numerous bird species, including herons, egrets, and eagles (USFWS, n.d. - c). |
| Point-aux-Chenes Wildlife Management Area (WMA) | Point-aux-Chenes WMA is a 35,000-acre marshland owned and operated by the Louisiana Department of Wildlife and Fisheries. Access to the WMA typically is limited to boats as there are no roads through the marshland. Notable game species present in the WMA include waterfowl, deer, rabbit, squirrels, rails, gallinules, and snipe. Both saltwater and freshwater fishing in the WMA is considered excellent due to the nearby Timbalier and Terrebonne Bay watersheds. Annual lotteries are held by the Louisiana Department of Wildlife and Fisheries for a waterfowl hunt exclusively for physically challenged hunters and a deer hunt for youth (Louisiana Department of Wildlife and Fisheries, n.d. - d). |

Table 1. (Continued).

| Wildlife Refuge, Wilderness Area, State or National Park | Resource Description |
|---|---|
| Lafourche Parish | |
| Point-aux-Chenes WMA | See description under Terrebonne Parish. |
| Wisner WMA | Owned by the Edward Wisner Donation Advisory Committee, the WMA is approximately 21,000 acres of bayous and canals. The WMA is open seasonally for small game and waterfowl hunting. |
| Plaquemines Parish | |
| Delta NWR | The Delta NWR was established in 1935 and covers 49,000 acres formed by the deposition of sediment from the Mississippi River. Its lush vegetation is the food source for a multitude of fish, waterfowl, and animals. The Delta NWR is the winter home for hundreds of thousands of snow geese, coots, and ducks. Endangered and threatened species in the NWR include the Piping Plover and the American alligator, which was de-listed as an endangered species in 1987 but remains listed as threatened due to similarity in appearance to the endangered American crocodile. The Delta NWR supports a wide variety of non-listed wildlife species. Tens of thousands of wintering waterfowl utilize the food resources found in the Delta NWR. Large numbers of other bird species can be found in the NWR, with numbers peaking during the spring and fall migrations. Large numbers of wading birds nest on the refuge, and thousands of shorebirds can be found on tidal mudflats and deltaic splays. Numerous furbearers and game mammals are year-round residents, and the marshes and waterways provide year-round and seasonal habitat for a diversity of fish and shellfish species (USFWS, n.d. - d). |
| Pass-a-Loutre WMA | The Pass-a-Loutre WMA is located in southern Plaquemines Parish at the mouth of the Mississippi River, approximately 10 miles (16 km) south of Venice and is accessible only by boat. The area is characterized by river channels with attendant channel banks, natural bayous, and man-made canals interspersed with intermediate and fresh marshes. The area is owned by the Louisiana Department of Wildlife and Fisheries and encompasses approximately 115,000 acres. The area is home to numerous species of shorebirds and other waterfowl. Alligators and small mammals are abundant. The inland waters provide habitat for fish, shrimp, and crabs (Louisiana Department of Wildlife and Fisheries, n.d. - e). |
| Breton NWR | Established in 1904, the Breton NWR is the second oldest NWR in the United States. Historically, the Breton NWR has been the site of a lighthouse station (destroyed by Hurricane Katrina), a quarantine station, a small fishing village, and an oil production facility. The Chandeleur Islands (where Breton NWR is located) are designated as critical habitat (as defined by the National Marine Fisheries Service) for the endangered Piping Plover, which is a common visitor to the refuge during fall, winter, and spring. The Western Gulf Coast population of Brown Pelicans was de-listed under the Endangered Species Act in 2009. The Brown Pelican is a year-round resident of southeast Louisiana, and the Breton NWR serves as important breeding grounds for these birds. The Breton NWR also provides habitat for colonies of nesting wading birds and seabirds as well as wintering shorebirds and waterfowl. Twenty-three species of seabirds and shorebirds frequently use the refuge, and 13 species nest on the various islands. The most abundant nesters are Brown Pelicans, Laughing Gulls, Royal Gulls, and Caspian and Sandwich Terns. Waterfowl winter near the refuge islands and use the adjacent shallows, marshes, and sounds for feeding and for protection during inclement weather. Redheads and Lesser Scaup account for the majority of waterfowl on the refuge. Other wildlife species found in the NWR include nutria, raccoons, and several species of sea turtles (USFWS, n.d. - e). |

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

Addressed in DOCD Section 1.

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

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

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

Addressed in DOCD Section 1 and Appendix I.

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

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

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

Addressed in DOCD Sections 1, 2, 4, and 9, and Appendices G and I.

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

Addressed in DOCD Appendix I.

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

Addressed in DOCD Section 1 and Appendix I.

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

Addressed in DOCD Section 1.

# 3 Consistency Certification

The analysis indicates that bp's DOCD for GC 868 is consistent with the enforceable policies of the LCRP according to the guidelines provided by the LCRP. Routine operations will have limited environmental impacts in the immediate vicinity of the drilling activities. Land-based support activities will originate from Louisiana.

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

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## Appendix I: Environmental Impact Analysis (EIA)

# Environmental Impact Analysis

for a

Supplemental Development Operations Coordination Document
for
Green Canyon Block 868 (OCS-G-33859)
Offshore Louisiana

December 2023

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# 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 |
| DOCD | Development Operations Control Document |
| DP | dynamically positioned |
| DPS | distinct population segment |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EIA | Environmental Impact Analysis |
| EIS | Environmental Impact Statement |
| 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 and Coordination Document (DOCD) for Green Canyon (GC) Block 868 (GC 868), Gulf of Mexico, Outer Continental Shelf (OCS)-G 33859. Under this DOCD, bp proposes to drill three production wells and install associated subsea infrastructure including jumpers, manifolds, and suction piles in GC 868. 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.

GC 868 is located within the Central Gulf of Mexico OCS Planning Area, approximately 134 statute miles (216 kilometers [km]) from the nearest shoreline (Plaquemines Parish, Louisiana), 137 statute miles (220 km) from the regional onshore support base (Port Fourchon, Louisiana), and 171 statute miles (275 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the proposed project location is approximately 1,329 m to 1,331 m (4,360 ft to 4,367 ft). A dynamically positioned (DP) semisubmersible or drillship is anticipated to be on site for approximately 123 days in 2024 going into 2025 for well drilling and completion activities associated with well DC6-C and 115 days each beginning in 2025 and possibly going into 2026 for well drilling and completion activities associated with wells DC6-D and DC6-E. An installation vessel is anticipated to be on site for approximately 200 days for subsea infrastructure installation.

The EIA for this DOCD was prepared for submittal to the Bureau of Ocean Energy Management (BOEM) in accordance with applicable regulations, including Title 30 Code of Federal Regulations (CFR) § 550.242 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 2017-2022 Programmatic Environmental Impact Statement (EIS) for the OCS Oil and Gas Leasing Program (BOEM, 2016a) and in multisale EISs for the Western and Central Gulf of Mexico Planning Areas (BOEM, 2012a,b; 2013; 2014a; 2015; 2016b; 2017; 2023). 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.

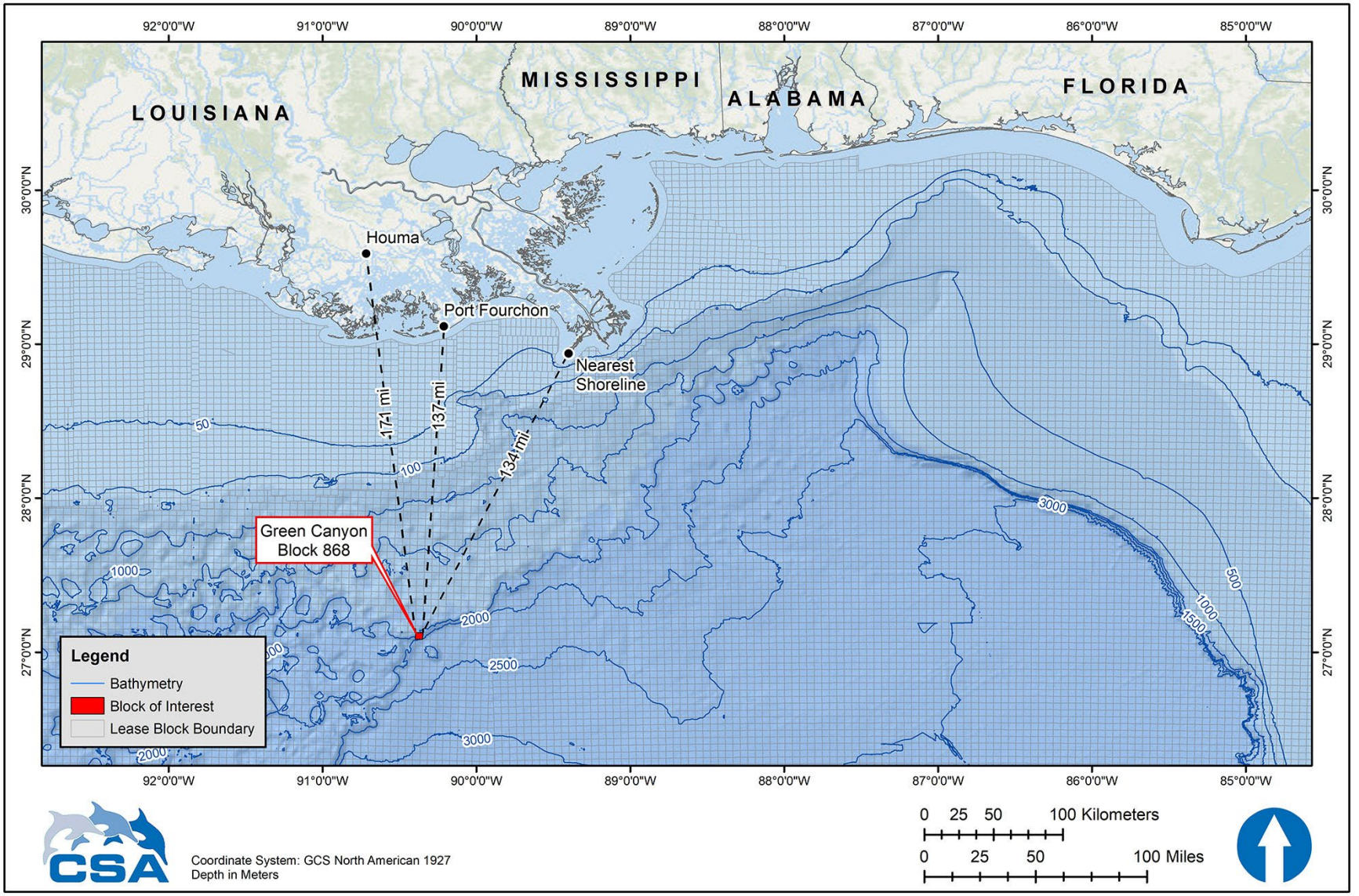


Figure 1. Location of Green Canyon Block 868 relative to the Louisiana shoreline and offshore bathymetric contours.

Oil spill response-related activities for the wells 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, 2021) | 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/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/Installation Vessel Presence, Marine Sound, and Lights

The activities proposed in this DOCD will be completed using DP 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 on the hull, 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 a cumulative minimum total of 353 days for all three wells, including 123 days beginning in 2024 possibly going into 2025 for well C and 115 days each for wells D and E beginning in 2025 and possibly going into 2026. The installation vessel is expected to be on site for approximately 200 days. The drilling rig and installation vessel will maintain exterior lighting in accordance with applicable federal navigation and aviation safety regulations (International Regulations for Preventing Collisions at Sea, 1972 [72 COLREGS], Part C).

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

During the physical presence of the drilling rig and associated subsea infrastructure installation activities there may be occasion 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/Installation Vessel Presence (incl. sound & lights) | Physical Disturbance to Seafloor | Air Pollutant Emissions | Effluent Discharges | Water Intake | Onshore Waste Disposal | Marine Debris | Support Vessel/ Helicopter Traffic | Accidents | |
| | | | | | | | | | Small Fuel Spill | Large Oil Spill |
| **Physical/Chemical Environment** | | | | | | | | | | |
| Air quality | -- | -- | **X** | -- | -- | -- | -- | -- | **X**(6) | **X**(6) |
| Water quality | -- | -- | -- | **X** | -- | -- | -- | -- | **X**(6) | **X**(6) |
| **Seafloor Habitats and Biota** | | | | | | | | | | |
| Soft bottom benthic communities | -- | **X** | -- | **X** | -- | -- | -- | -- | -- | **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) |
| 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/Installation Vessel Presence (incl. sound & lights) | Physical Disturbance to Seafloor | Air Pollutant Emissions | Effluent Discharges | Water Intake | Onshore Waste Disposal | Marine Debris | Support Vessel/ Helicopter Traffic | Accidents | |
| | | | | | | | | | Small Fuel Spill | Large Oil Spill |
| **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 are no features indicative of seafloor hard bottom that could support high-density chemosynthetic communities or coral communities within 610 m (2,000 ft) of the proposed activities locations (bp, 2023).

*(5) Exploration or production activities where Hydrogen Sulfide ($H_2S$) concentrations greater than 500 ppm might be encountered.*

- GC 868 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. A previously submitted archaeological report determined that none of the sonar contacts in the project area were identified as being archaeologically significant.

*(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/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/or installation vessel 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 subsea 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 subsea 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 on the seafloor will be disturbed during seafloor infrastructure installation activities. These disturbances will be limited to the immediate vicinity of where equipment will be installed.

## 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 7 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 6.2 and DOCD Appendix D. All offshore discharges are expected to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit issued by the U.S. Environmental Protection Agency (USEPA) 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 or subsea installation activities and 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 and/or installation vessel may relocate to a safe zone which is not located within the leased area to avoid severe weather, loop currents, or to conduct routine maintenance while idled from 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 on the drilling rig. Section 316(b) of the Clean Water Act requires NPDES permits to ensure that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available to minimize adverse environmental impact from impingement and entrainment of aquatic organisms. The General NPDES Permit specifies design requirements for facilities for which construction commenced after 17 July 2006 with a cooling water intake

structure having a design intake capacity of greater than two million gallons of water per day, of which at least 25% is used for cooling purposes. It is expected that the drilling rig ultimately selected for this project will be in compliance with all applicable cooling water intake structure design requirements, monitoring, and limitations. Where applicable, the drilling rig operator takes responsibility for obtaining necessary NPDES permit coverage for its cooling water intake structure and associated permit compliance.

## A.6 Onshore Waste Disposal

A list of the solid and liquid wastes generated during this project to be disposed of onshore are tabulated in DOCD Section 6.1. Wastes generated during the proposed project are expected to be properly stored and segregated on the drilling rig/installation vessel. 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 (Conn and Silber, 2013; Hazel et al., 2007; Jensen and Silber, 2004; Laist et al., 2001; Vanderlaan and Taggart, 2007; 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, 2021), 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 seven round trips per week between the drilling rig/installation vessel 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 868 during the proposed project.

| Vessel/Aircraft Type | Maximum Fuel Tank Storage Capacity | Estimated Trip Frequency or Duration |
|---|---|---|
| Helicopter | 760 gal | 7 flights per week |
| Crew boats | 1,000 bbl | 2 trips per week |
| Supply Boats | 1,000 bbl | 4 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 191 OCS-related collisions between 2007 and 2021 (BSEE, 2021). 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 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, 2017b) 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 868 is classified as $H_2S$ Absent. See DOCD Section 4 for $H_2S$ management information.

### A.9.1 Small Fuel Spill

Spill Size. According to the analysis by BOEM (2017b), the most likely type of small spill (<1,000 bbl) resulting from OCS activities is a failure related to the storage of oil or diesel fuel. Historically, most diesel spills have been ≤1 bbl, and this is predicted to be the most common spill volume in ongoing and future OCS activities in the Western and Central Gulf of Mexico Planning Areas (Anderson et al., 2012). As the spill volume increases, the incident rate declines dramatically (BOEM, 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 (BOEM, 2016a).

The water-soluble fractions of diesel are dominated by two- and three-ringed polycyclic aromatic hydrocarbons (PAHs), which are moderately volatile (National Research Council, 2003a). The constituents of these oils are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. Due to its light density, diesel will not sink to the seafloor. Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high 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], 2006).

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 134 statute miles (216 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, 2018).

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

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

Under this DOCD, bp proposes to drill three production wells in GC 868. 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 135,000 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 11.5 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[1] 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 868 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 868 (GC 868) 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 868 (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 |

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

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

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, 2006).

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 134 statute miles (216 km) from the nearest shoreline (Plaquemines Parish, Louisiana), 137 statute miles (220 km) from the onshore support base at Port Fourchon, Louisiana, and 171 statute miles (275 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed activities range from approximately 1,329 m to 1,331 m (4,360 ft to 4,367 ft) (**Figure 2**).

The proposed wells are situated on top of the Sigsbee Escarpment in a relatively flat area surrounded by seafloor scarps (bp, 2023). bp (2023) presents additional information on reprocessed 3D seismic data, autonomous underwater vehicle data, and offset well data.

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, 2023). These regional descriptions, applicable to GC 868, 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**.

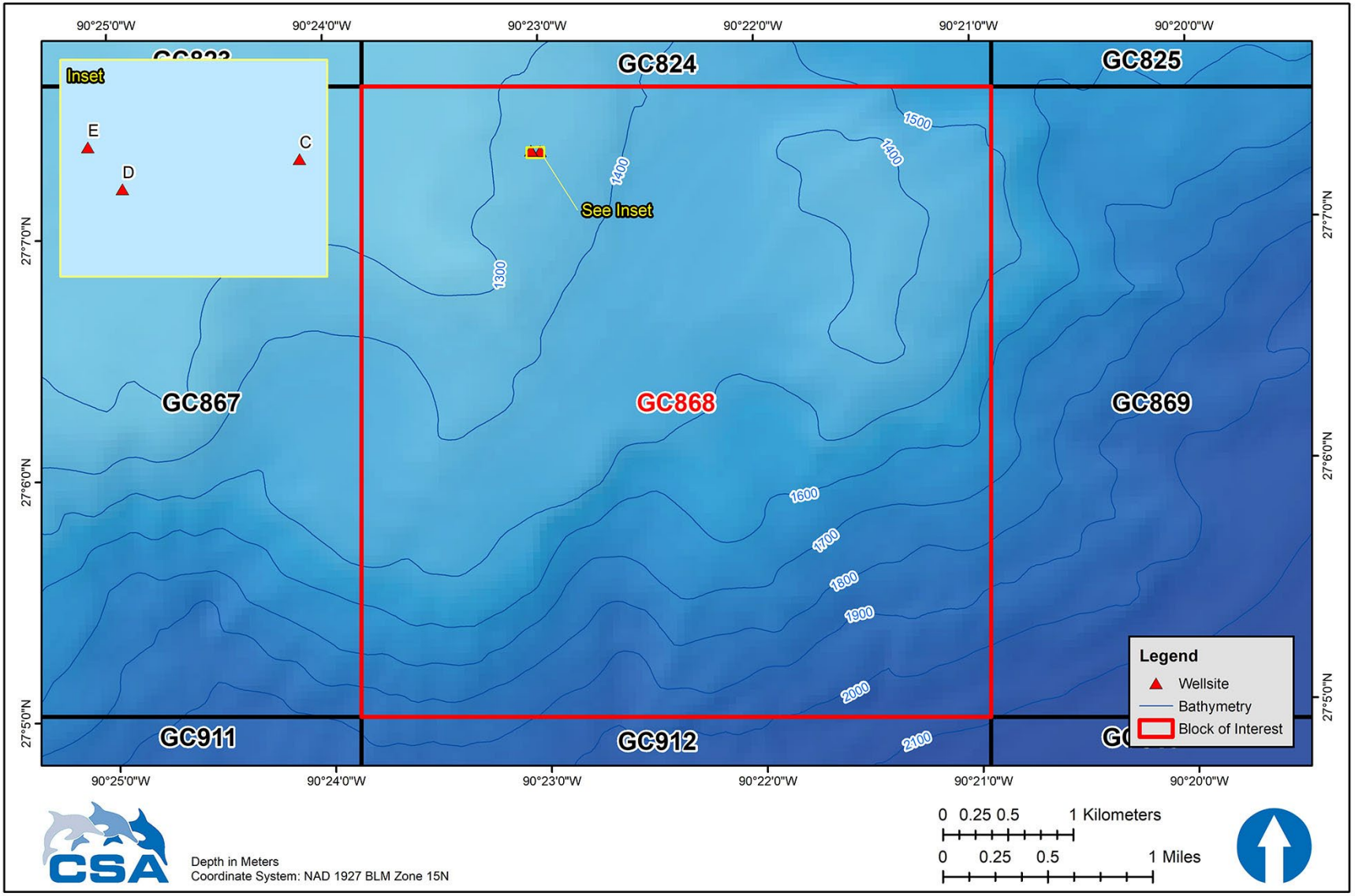


Figure 2. Bathymetric map of the project area showing the proposed wellsite surface hole locations in Green Canyon Block 868.

# 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) 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 November 2023, 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, 2023). 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 subsea 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 (2017b), emissions from routine activities

are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, anticipated emission rates, anticipated heights of emission sources, and the distance to shore of the proposed activities. 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, 2016a). Carbon dioxide ($CO_2$) and methane ($CH_4$) emissions from the project would constitute a small incremental contribution to greenhouse gas emissions from all OCS activities. According to Programmatic and OCS lease sale EISs (BOEM, 2016a; 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 190 statute miles [2] (306 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 407 statute miles (655 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.

[2] Distance calculated based on the nearest point of Green Canyon Block 868.

### 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, 2023). 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/installation vessel. 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 (134 statute miles [216 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 activities (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/installation vessel will flow overboard without treatment. However, rainwater that falls on the drilling rig/installation vessel 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, 2023). The EIA small spill scenario is proposed to occur in offshore waters at or near the drilling rig/installation vessel. 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, 2017a). 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, 2006; 2017a). Given the open ocean location of the project area, the extent and duration of water quality impacts from a small spill would not be significant.

### Impacts of a Large Oil Spill

Potential impacts of a large oil spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a; 2015; 2016b; 2017, 2023). 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, 2017b).

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 134 statute miles (216 km) from the nearest shoreline (Plaquemines Parish, Louisiana), it is expected that most water quality impacts would occur in offshore waters before low molecular weight alkanes and volatiles are weathered (Operational Science Advisory Team, 2011), especially in the event of a spill lasting less than 30 days. The 30-day OSRA modeling (**Table 4**) indicates nearshore waters and

embayments of 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 1,329 m to 1,331 m (4,360 ft to 4,367 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 hard bottom communities or potential seepage locations within 610 m (2,000 ft) of the proposed activities (bp, 2023). 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 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 $ha^{-1}$) |
| GKF | 2,465 | 84,348 | 737 | -- |
| C4 | 1,463 | 273,585 | 3,045 | 743 |

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

Densities of meiofauna (animals passing through a 0.5-mm sieve but retained on a 0.062-mm sieve) at stations in the vicinity of the project area ranged from approximately 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 868 is expected to range from approximately 2,539 individuals $m^{-2}$ to 2,535 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 3W which consists of stations on the mid Texas-Louisiana Slope ranging in depth from 1,875 to 3,008 m (6,152 to 9,869 ft). The most abundant species in this zone were the polychaetes *Levinsenia uncinata*, *Paraonella monilaris*, and *Tachytrypane* spp.; the bivalve *Heterodonta* spp.; and the isopod *Macrostylis* sp.

The megafaunal density at one nearby 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 on the seafloor will be disturbed during seafloor infrastructure installation activities. These disturbances will be limited to the immediate vicinity of where equipment will be installed.

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 mud 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 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 shallow hazards assessment for the proposed activities (bp, 2023), there are no seafloor features that could support 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, 2023). Oil droplets or oiled sediment particles could come into contact with chemosynthetic organisms or deepwater corals in the vicinity of the spill

site. Impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; reduction or loss of one or more commercial and recreational fishery habitats; or changes in sediment characteristics (BOEM, 2012a; 2017).

### C.2.3 Designated Topographic Features

GC 868 is not within or near a designated topographic feature or a no-activity zone as identified in NTL 2009-G39. The nearest designated Topographic Feature Stipulation Block is located approximately 66 statute miles (106 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to designated topographic features.

Due to the distance from the project area, it is unlikely that designated topographic features could be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth 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 184 statute miles (296 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 220 statute miles (354 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. The 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 |
| Fishes | | | | | |
| Oceanic whitetip shark | *Carcharhinus longimanus* | T | X | -- | None |
| Giant manta ray | *Mobula birostris* | T | X | X | None |

Table 6. (continued).

| Species | Scientific Name | Status | Potential Presence | | Critical Habitat Designated in Gulf of Mexico |
|---|---|---|---|---|---|
| | | | Project Area | Coastal | |
| Gulf sturgeon | *Acipenser oxyrinchus desotoi* | T | -- | X | Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle) |
| Nassau grouper | *Epinephelus striatus* | T | -- | X | None |
| 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 |
| 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 |
| 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 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 Federal Register [*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*), 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*), and four subspecies of beach mouse. Critical habitat has been designated for all of these species (except the Florida salt marsh vole) 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*), and giant manta ray (*Mobula birostris*) 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, or the sperm whale.

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. (2022) suggests the range may be broader than previously thought (see **Section C.3.2**). The giant manta ray could occur in the project area but is most commonly observed in the Gulf of 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. 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 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.3.16**).

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/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/Installation Vessel Presence, Marine Sound, and Lights

Sound from routine drilling and subsea 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 activities, 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, 2015a). 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 $\mu Pa^2$ s. Similarly, temporary threshold shifts are estimated to occur when the mammal has received an $SEL_{24h}$ of 178 dB re 1 $\mu Pa^2$ s. Due to transient nature of sperm whales and the stationary nature of installation activities, it is not expected that any sperm whales will remain in proximity to the source for a full 24-hour period to receive an $SEL_{24h}$ necessary for the onset of auditory threshold shifts.

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar marine sound sources. Drilling-related marine sound associated with this project 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 activity 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/installation vessel lighting and presence are not expected to impact sperm whales (NMFS, 2007; BOEM, 2016a; 2017) and therefore, are not identified as IPFs (NMFS, 2007, 2020b; BOEM, 2017).

### 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, 2021). 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, 2021).

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 (2021) 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, 2023). 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. (2022) 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 (i.e., silver rag [*Ariomma bondi*]). The silver rag is found at a depth range of 25 to 640 m (82 to 2,100 ft) primarily over muddy bottoms on the OCS although juveniles can be within the surficial waters (Smithsonian Tropical Research Institute, 2015). Therefore, it is unlikely that Rice's whales would occur in the project area. However, support vessels transiting through the 25 to 640 m (82 to 2,100 ft) water depths could encounter a Rice's whale, although unlikely given the rate of sightings of the whales.

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.

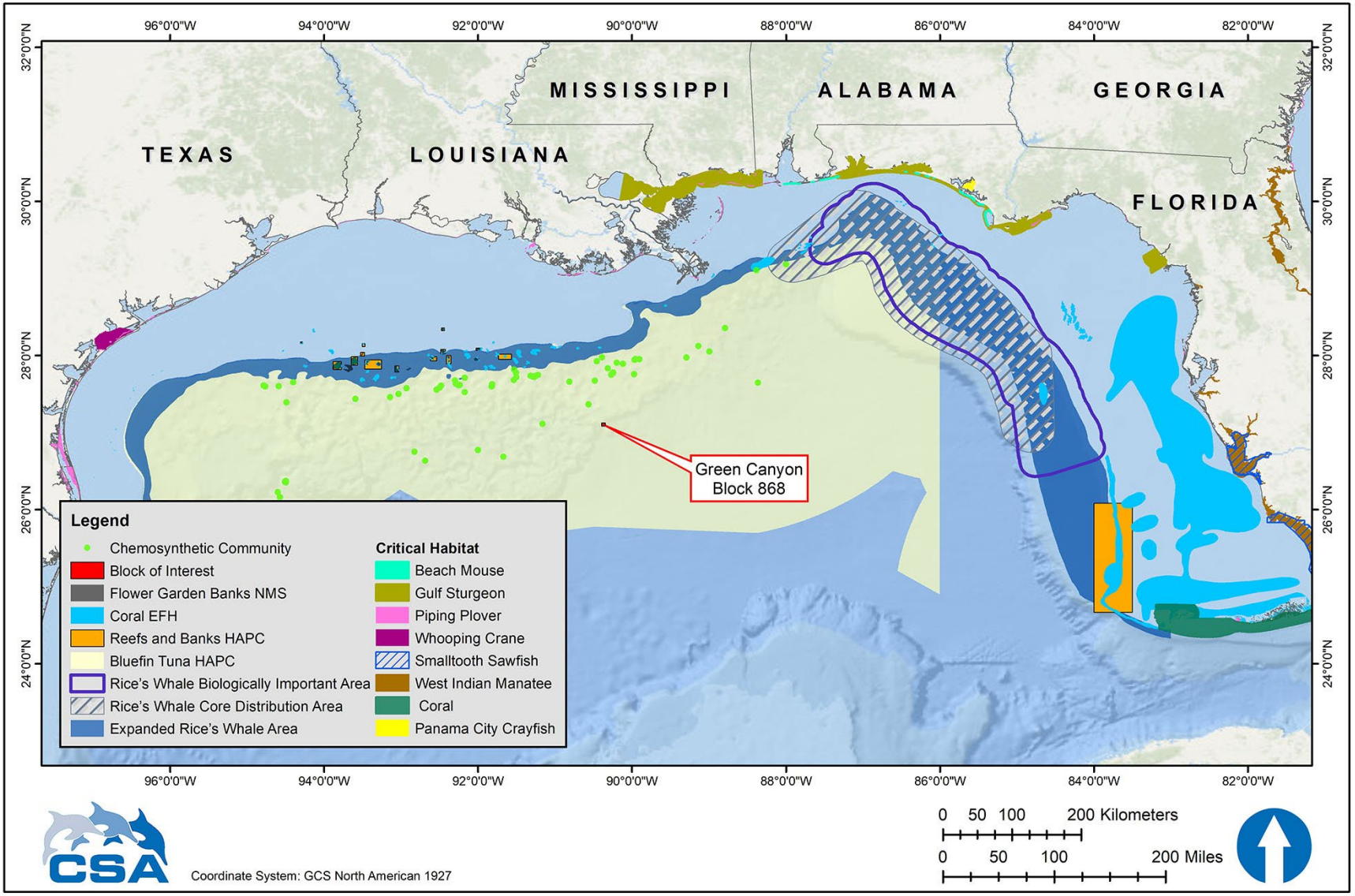


Figure 3. Location of selected environmental features in relation to the project area. EFH = Essential Fish Habitat; HAPC = Habitat Area of Particular Concern; NMS = National Marine Sanctuary.

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/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/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 drilling-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 and installation 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 subsea 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 $\mu Pa^2$ s and 179 re 1 $\mu Pa^2$ s, repectively. 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-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/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. Kiska 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, 2021) 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, 2021). 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, 2021).

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, 2021). 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 local (Gulf of Mexico) stock of Rice's whales. However, it is very 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). 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; 2023), 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, 2021) (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 local (Gulf of Mexico) stock 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. Consequently, the probability of spilled oil from a project-related well blowout reaching Rice's whales is extremely low.

### 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 134 statute miles (216 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, 2021). Vessel collision avoidance measures described in NMFS (2020a, 2021) 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) overpopulated 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, 2021). 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, 2021) (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; Hldebrand 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 (*Tursiops truncatus*), Clymene dolphin (*Stenella clymene*), false killer whale (*Pseudorca crassidens*), Fraser's dolphin (*Lagenodelphis hosei*), killer whale (*Orcinus orca*), melon-headed whale (*Peponocephala electra*), pantropical spotted dolphin, 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/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/Installation Vessel Presence, Marine Sound, and Lights

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

If the vessel(s) are equipped with a moon pool, a trained crew member or company representative must monitor the moon pool area for marine mammals during operations. If a marine mammal is detected in the moon pool, immediate reporting to NMFS, BOEM, and BSEE is required (NMFS, 2020a).

Sound from routine drilling and subsea installation operations has the potential to disturb marine mammals. As discussed in **Section A.1**, sound impacts would be expected at greater distances when DP thrusters are in use than with vessel and 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 $\mu Pa^2$ s over a 24-hour period. Simlarly, temporary threshold shifts are estimated to occur when the mammal has received an SEL of 178 dB re 1 $\mu Pa^2$ s over a 24-hour period. Due to the transient nature of marine mammals and the stationary nature of the proposed activites, 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 installation 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/installation and support 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; 2023). 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; 2023). 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, 2021) 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, 2014a). 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, 2014a).

The nearest designated critical habitat for loggerhead sea turtles, nesting beaches and nearshore reproductive habitats, is approximately 234 statute miles (377 km) from the project area. The project area is located within the designated *Sargassum* critical habitat for loggerhead sea turtles (**Figure 4**).

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.

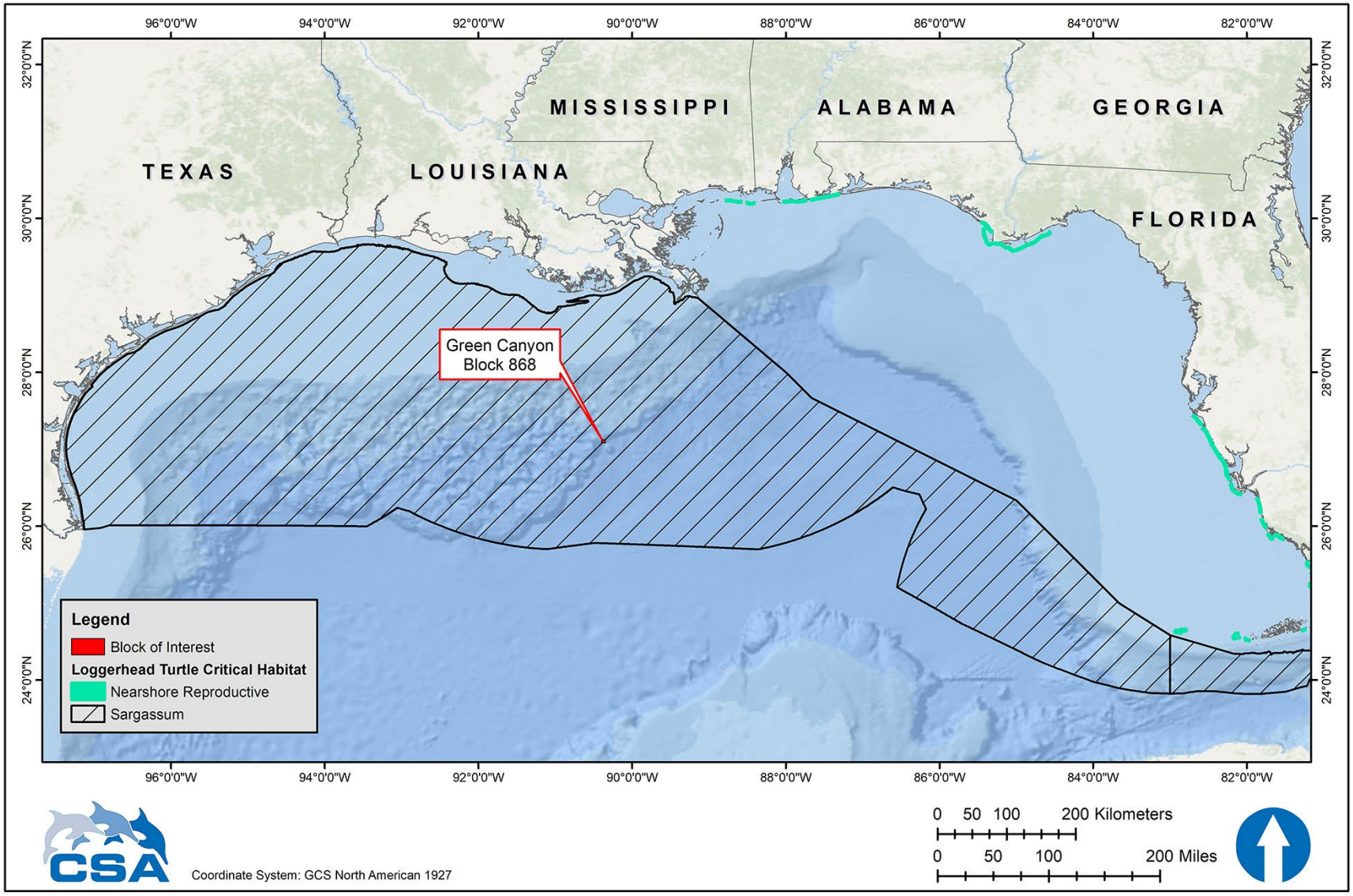


Figure 4. Location of loggerhead turtle designated *Sargassum* critical habitat and nearshore reproductive critical habitat in relation to the project area.

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. A total of 284 Kemp's ridley turtle nests were counted on Texas beaches for the 2022 nesting season and total of 262 Kemp's ridley turtle nests were counted on Texas beaches during the 2020 nesting season (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/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/Installation Vessel Presence, Marine Sound, and Lights

Drilling and subsea 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 $\mu Pa^2$ 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 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(s) are 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. Therefore, no significant impacts are expected.

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; 2023). 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 234 statute miles (377 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, 2014a). 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 (Bird Life 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 133 statute miles (214 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, 2016). One population overwinters along the Texas coast at Aransas NWR and summers at Wood Buffalo National Park in Canada. This population represents the majority of the world's population of free-ranging Whooping Cranes, reaching an estimated population of 536 at Aransas NWR during the 2022 to 2023 winter (USFWS, 2023), 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 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 (380 km) from the Aransas NWR, which is the nearest designated critical habitat. The 30-day OSRA modeling (**Table 4**) predicts a <0.5% or less chance of oil contacting Whooping Crane critical habitat within 30 days of a spill.

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 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 (2018b) 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/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/Installation Vessel Presence, Marine Sound, and Lights

Offshore drilling and subsea 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 or installation subsea 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 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.3.9 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, 2018). The giant manta ray became listed as Threatened under the ESA in 2018.

Commercial fishing is the primary threat to giant manta rays (NOAA, 2018). The species is targeted and caught as bycatch in several global fisheries throughout its range. Although protected in U.S. waters, protection of populations is difficult as they are highly migratory with sparsely distributed and fragmented populations throughout the world. Some estimated regional population sizes are small (between 100 to 1,500 individuals) (Marshall et al., 2018; NOAA, 2018). Stewart et al. (2018) 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/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/Installation Vessel Presence, Marine Sound, and Lights

Offshore drilling and subsea 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 or subsea 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, 2018). Because of this shallow water feeding behavior, giant manta rays would be more likely to be impacted by floating oil than other species which 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.3.10 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, 2014a) (**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 224 statute miles (360 km) from the nearest Gulf sturgeon critical habitat. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a <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.3.11 Nassau Grouper (Threatened)

The Nassau grouper (*Epinephelus striatus)* is a Threatened, long-lived reef fish typically associated with hard bottom structures such as natural and artificial reefs, rocks, and underwater ledges (NOAA, nd). 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, nd). The Nassau grouper was listed as Threatened under the ESA in 2016 (81 *FR* 42268).

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, nd). 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 hydrocarbon 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 201 statute miles [323 km]), and the difference in water depth between the project area (1,329 m to 1,331 m [4,360 ft to 4,367 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.3.12 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, nd). 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, 2018c), data from 1989 to 2004 indicated a slight increasing trend in population numbers in Everglades National Park during that time period (Carlson et al., 2007). More recent data resulted in a similar conclusion, with indications that populations were stable or slightly increasing in southwest Florida (Carlson and Osborne, 2012).

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

#### Impacts of a Large Oil Spill

The project area is approximately 91 miles (146 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.3.13 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; 2023). 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 255 statute miles (410 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a <0.5% or less 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.3.14 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 449 miles (723 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.3.15 Panama City Crayfish (Threatened)

The USFWS issued a Final Rule designating the Panama City crayfish as Threatened under the ESA on 5 January 2022 (effective 4 February 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 349 miles (562 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a <0.5% or less 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.3.16 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, 2014), 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, but none has been designated for the other threatened coral species included here. A species description of elkhorn coral is presented in the recovery plan for the species (NMFS, 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 201 statute miles [323 km]), and the difference in water depth between the project area (1,329 m to 1,331 m [4,360 ft to 4,367 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.4 Coastal and Marine Birds

### C.4.1 Marine Birds

Marine birds include seabirds and other species that may occur in the pelagic environment of the project area (Clapp et al., 1982a; Clapp et al., 1982b; 1983; Davis and Fargion, 1996; Davis et al., 2000). Seabirds spend much of their lives offshore over the open ocean, except during breeding season when they nest along the coast (on the mainland and on barrier islands). In addition, other birds such as waterfowl, marsh birds, and shorebirds may occasionally be present over open ocean areas. No Endangered or Threatened bird species are likely to occur at the project area due to the distance from shore. For a discussion of shorebirds and coastal nesting birds, see **Section C.4.2**.

Seabirds of the northern Gulf of 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/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/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). Mortality of migrant birds at tall towers and other land-based structures has been reviewed extensively, and the mechanisms involved in rig collisions appear to be similar. In some cases, migrants simply do not see a part of the rig until it is too late to avoid it. In other cases, navigation may be disrupted by marine sound (Russell, 2005). On the other hand, offshore structures are suitable stopover perches for most trans-Gulf migrant species, and most of the migrants that stop over on rigs probably benefit from their stay, particularly in spring (Russell, 2005). Due to the limited scope and short duration of activities described in this DOCD, any impacts on populations of either seabirds or trans-Gulf migrant birds are not expected to be significant.

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may also be present in the project area. Migrant birds may use offshore structures, including platforms and semisubmersibles for resting, feeding, or as temporary shelter from inclement weather (Russell, 2005). Some birds may be attracted to offshore structures because of the lights and the fish populations that aggregate around these structures. A study in the North Sea indicated that rig lighting causes circling behavior in various birds, especially on cloudy nights; apparently the birds' geomagnetic compass is upset by the red part of the spectrum from the lights currently in use (Van de Laar, 2007; Poot et al., 2008). The numbers varied greatly, from none to some tens of thousands of birds per night per rig, with an apparent effect radius of up to 3 miles (5 km) (Poot et al., 2008). A study in the Gulf of 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/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/installation vessel 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, 2016).

### C.4.2 Coastal Birds

Threatened and Endangered bird species (Piping Plover and Whooping Crane) have been discussed previously in **Sections C.3.6** and **C.3.7**. The western Gulf of Mexico (in the US EEZ from Texas to Mississippi) is a known wintering area for the Threatened Rufa Red Knot (*Calidris canutus rufa*) (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, 2022) 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 134 statute miles (216 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 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 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/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/Installation Vessel Presence, Marine Sound, and Lights

The drilling rig and installation vessel, 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;

Relinim 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/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 vessel, 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 $\mu Pa^2$ s but resulted in no increased mortality between the exposure and control groups. Non-impulsive sound sources (such as drilling rig and subsea 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 will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. The intake of seawater for cooling water will entrain plankton, 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 activities, any short-term impacts of entrainment are not expected to be significant to plankton or ichthyoplankton populations (BOEM, 2017). The drilling rig 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 66 statute miles (106 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 868, 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 tuna | *Thunnus obesus* | Juveniles, adults |
| Bigeye thresher shark | *Alopias superciliosus* | All |
| Blue marlin | *Makaira nigricans* | Juveniles, adults |
| Longbill spearfish | *Tetrapturus pfluegeri* | Juveniles, adults |
| Longfin mako shark | *Isurus paucus* | All |
| Oceanic whitetip shark | *Carcharhinus longimanus* | All |
| Silky shark | *Carcharhinus falciformis* | All |
| Skipjack tuna | *Katsuwonus pelamis* | Spawning, adults |
| Shortfin mako shark | *Isurus oxyrinchus* | All |
| 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 2017-2022 Gulf of Mexico Multisale EIS (BOEM, 2017). The EFH assessment was completed and there is ongoing coordination among NMFS, BOEM, and BSEE, including discussions of mitigation (BOEM, 2016c).

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. Jakkula Bank is the HAPC located nearest to the project area (approximately 91 statute miles [146 km]).

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

The drilling rig and installation vessel, as a 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 and installation vessel 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 vessel 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 recent lease sale 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 66 statute miles (106 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; 2023). For this DOCD, there are no unique site-specific issues with respect to EFH.

An oil spill in offshore waters would temporarily increase hydrocarbon concentrations on the water surface and potentially in the subsurface as well. Given the extent of EFH designations in the Gulf of 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 66 statute miles (106 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 archeological assessment identified no archaeologically significant artifacts or shipwrecks within 610 m (2,000 ft) of the proposed wellsites based on an autonomous underwater vehicle survey (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 wellsites, 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 Lease Sale 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 wellsites of approximately 1,329 m to 1,331 m (4,360 ft to 4,367 ft), the proposed project area 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 found in the project area, the only relevant IPF is a large oil spill. A small fuel spill would not affect prehistoric archaeological resources because the oil would float and dissipate on the sea surface.

#### Impacts of a Large Oil Spill

Because prehistoric archaeological sites are not found in the project area, they would not be affected by the physical effects of a subsea blowout. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300-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 134 statute miles (216 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 12, may have a minor incremental impact on barrier beaches and dunes, wetlands, oyster reefs and protected areas. Over time, with a large number of vessel trips, vessel wakes can erode shorelines along inlets, channels, and harbors, resulting in localized land loss. Impacts to barrier beaches and dunes, wetlands, oyster reefs and protected areas will be minimized by following the speed and wake restrictions in harbors and channels.

Support operations, including crew boats and supply boats are not anticipated to have a significant impact on submerged seagrass beds. While submerged seagrass beds could be uprooted, scarred, or lost due to direct contact from vessels, use of navigation channels and adherence to local requirements and implemented programs will decrease the likelihood of impacts to these resources (BOEM, 2017).

### Impacts of a Large Oil Spill

Potential spill impacts on coastal habitats are discussed by BOEM (2017; 2023). 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 South unit |
| | 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 | Lacassine National Wildlife Refuge |
| | Sabine National Wildlife Refuge |
| | Rockefeller State Wildlife Refuge and Game Preserve |
| | Peveto Woods Sanctuary |
| Vermilion, Louisiana | Paul J. Rainey Wildlife Refuge and Game Preserve |
| | Rockefeller State Wildlife Refuge and Game Preserve |
| | State Wildlife Refuge |
| Terrebonne, Louisiana | Isles Dernieres Barrier Islands Refuge |
| | Pointe aux Chenes Wildlife Management Area |
| Lafourche, Louisiana | Pointe-aux-Chenes Wildlife Management Area |
| | Wisner State Wildlife Management Area (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, 2023). In addition to the direct impacts of oil, cleanup activities in marshes may accelerate rates of erosion and retard recovery rates (BOEM, 2017). 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 is drilling rig/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/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; 2023). 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 134 statute miles (216 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/installation vessel 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; 2023). For this DOCD, there are no unique site-specific issues with respect to these impacts.

Impacts on recreation and tourism would vary depending on the duration of the spill and its fate, including the effectiveness of response measures. A large spill that reached coastal waters and shorelines could adversely affect recreation and tourism by contaminating beaches and wetlands, resulting in negative publicity that encourages people to stay away. The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Texas and Louisiana could be contacted within 30 days (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; 2023). 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 or shipping lane. However, GC 868 is located in Military Warning Area W-92. bp intends to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

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 or shipping lane. However, GC 868 is located within a 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[3]

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 2017 to 2022 Programmatic Environmental Impact Statement for the OCS Oil and Gas Leasing Program (BOEM, 2016a), and the Final Programmatic EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2017-2022 (BOEM, 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; 2023).

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; 2023).

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.

[3] On May 20, 2022, the National Environmental Policy Act (NEPA) original requirements came into effect and were reinstated by the Council on Environmental Quality (CEQ), which is responsible for Federal agency implementation of NEPA.

# D. Environmental Hazards

## D.1 Geologic Hazards

The shallow hazards assessment 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/installation vessel selected for this project. High winds and limited visibility during a severe storm could disrupt support activities (vessel and helicopter traffic) and make it necessary to implement bp contingency plans to suspend some activities on the drilling rig/installation vessel for safety reasons until the storm or weather event passes. From 1992 to 2023, 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, 2023).

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/installation vessel selected for this project. High waves during a severe storm could disrupt support activities (i.e., vessel and helicopter traffic), and risks to the 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/installation vessel 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/installation vessel will be inspected to ensure pollution pans have been cleaned and to confirm that plugs have been installed prior to leaving the dock and prior to loading on the boat.
- 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:

- Deborah Kilbane (Senior Scientist);
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- Vanessa Ward (GIS Analyst);
- Deborah Murray (Document Production); and
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## Appendix J: New Technology

# 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: Fee Recovery

# Receipt

## Tracking Information

Pay.gov Tracking ID: 27A9NIOM

Agency Tracking ID: 76581471599

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: 12/18/2023 11:28:12 PM EST

Payment Date: 12/18/2023

Region: Gulf of Mexico

Contact: Adalberto Garcia (281) 995-2815

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

Lease Number(s): 09981, 33859

Area-Block: Green Canyon GC, 825: Green Canyon GC, 868

Type-Wells: Supplemental Plan, 1

## Account Information

Cardholder Name: Adalberto Garcia

Card Type: Master Card

Card Number: **********1978