UNITED STATES GOVERNMENT
MEMORANDUM

January 12, 2021

To: Public Information (MS 5030)

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

Subject: Public Information copy of plan

Control # - S-08037

Type - Supplemental Development Operations Coordinations Document

Lease(s) - OCS-G19966 Block - 562 Mississippi Canyon Area

Operator - BP Exploration & Production Inc.

Description - Subsea Wells C and D

Rig Type - Not Found

Attached is a copy of the subject plan.

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

Leslie Wilson
Plan Coordinator

Site Type/Name	Botm Lse/Area/Blk	Surface Location	Surf Lse/Area/Blk
WELL/C	G19966/MC/562	3536 FNL, 5394 FEL	G19966/MC/562
WELL/D	G19966/MC/562	3472 FNL, 5358 FEL	G19966/MC/562

Betsy Cleland
Lead Regulations and Permitting Advisor
Gulf of Mexico Region

bp Exploration & Production Inc.
501 Westlake Park Blvd
Houston, Texas 77079
Telephone: 281-773-9088
Email: Betsy.Cleland@bp.com

December 8, 2020 Via FedEx

Ms. Michelle Uli Picou
Plans Section Chief MS GM 1053C
Bureau of Ocean Energy Management
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

Reference: Supplemental DOCD, Isabela 3 MC562 003
Mississippi Canyon Block 562
Lease OCS-G 19966

Ms. Picou:

bp Exploration and Production Inc. (bp) submits for your review and approval a Supplemental Development Operations Coordination Document (SDOCD) for the Isabela 3 MC562 003 Prospect, Mississippi Canyon Block 562, Lease OCS-G 19966. This SDOCD is to produce the MC562 003 well and the installation of a well jumper to existing infrastructure.

Enclosed please find the following:

- One digital copy each of the SDOCD proprietary and public information versions
- One digital copy of the SDOCD public information version for CZM review

If you need further information regarding this matter, please contact me at 281-773-9088 or by e-mail to betsy.cleland@bp.com.

Sincerely,

Betsy Cleland

Betsy Cleland
Lead Regulations & Permitting Advisor

Global Projects Organization

Na Kika Isabela 3 Project

Supplemental Development Operations Coordination Document (SDOCD)

Public

Betsy Cleland
BP Exploration and Production Inc.
501 Westlake Park Blvd.
Houston, TX 77079
281-773-9088
Betsy.Cleland@bp.com

B01	Issued for Review	Betsy Cleland				Elizabeth Komiskey	
Rev	Reason for Issue	Author	Date	Checker	Date	Approver/Issuing Authority	Date

Refresh Cycle Code (Years):	

Unique Identifier:	Not Applicable	**GPO Document Number:** GM047-PM-PRM-000-00001	BP Doc Rev
RD Type:	Not Applicable		**B01**
Refresh Cycle Code (Years):			

Revision History*

Revision Date	Revision Number	Approver	Revision

* Only required for B02 versions and beyond.

Operating Management System (OMS)

OMS Sub-element	OMS Sub-element Title	Relevant Section(s) of this Document

MPcp/CBcp References

MPcp/CBcp/ Both	Stage	MPcp/CBcp/Both Functional Element	Relevant Section(s) of this Document

Any document which is needed to comply with the Major Projects Common Process (MPcp) or the Category B Common Process (CBcp) is noted in the MPcp / CBcp references table above.

Reviewers

Name	Role	Signature	Date Reviewed
Betsy Cleland	Regulations & Permitting Advisor		
Matt Hurliman	Reservoir Engineer		
Joy Austin-Ramsaran	Environmental Advisor		
Polycarp Kamau	Subsea Engineering Lead		
Clara Gaertner	Na Kika Project Manager		
Farley Burge	Senior Counsel		
Elizabeth Komiskey	Manager, Regulatory, Compliance & Environmental		

* Legal review is required for all documents that are GPO OMS elements 1-4.

** SORC review required for all procedures, templates and specifications as applicable to projects.

TABLE OF CONTENTS

1 Plan Contents

1.1 Description of Activities

BP Exploration & Production Inc. (BP) will drill and complete the OCS-G 19966 Lease, Mississippi Canyon Block 562 Well 003 under the Revised Exploration Plan (R-7040) filed with the BOEM on October 21, 2020. The Diamond Black Lion will drill the MC562 003 well and perform completion operations.

This supplemental Development Operations Coordination Document (DOCD) provides for the following operations:

- The Isabela 3 (I-3) project consists of a single well subsea tie-back to the existing subsea facilities at the Galapagos (LSPS) Oil Loop, more specifically to the spare hub on IS PLEM 1. I-3 will be drilled near Isabela 2 (I-2), just outside the LSPS (Galapagos loop) at approximately 60-100 ft. radius from IS PLEM 1. The well will be tied back to existing IS PLEM 1 via a rigid jumper. A new Subsea Metering Skid (SMS) will tie into the existing Isabela UTA via flying leads to route hydraulics and chemicals to the I-2 and I-3 subsea tree. Subsea chemical metering valves will be used in the SMS to share chemicals between the I-2 and I-3 wells.
- Commence production from the Mississippi Canyon Block 562 Well 003 (I-3).

Included in **Appendix A** is Form BOEM 137 "OCS Plan Information Form" which provides for the installation of the jumper and SMS and commencement of production from the associated well.

1.2 History of Leases

BP acquired lease OCS-G 19966 in Mississippi Canyon (MC) Area Block 562 in 1997. The lease has royalty relief and is held by production from the MC562-1 well (I-1). Record title is held 100% BP.

An initial Exploration Plan (EP) N-8778 for Mississippi Canyon Block 562 was submitted by BP Exploration & Production Inc. and approved in August 18, 2006 to drill and temporarily abandon four (4) exploratory wells.

An initial Development Operations Coordination Document (DOCD) N-9461 for Mississippi Canyon Block 562 was submitted by BP Exploration & Production Inc. and approved on March 26, 2010 to tie-back and produce MC562 001.

A revised Exploration Plan (REP) R-6704 for Mississippi Canyon Block 562 was submitted by BP Exploration & Production Inc. and approved in June 21, 2018 to drill and complete MC562 002.

An Environmental Assessment was completed and approved in April 2018 as part of the revised Exploration Plan Control No. R-6704.

The current lease operator and ownership are as follows:

Area / Block Lease No.	Operator	Ownership
Mississippi Canyon 562	BP Exploration & Production Inc.	BP Exploration & Production Inc. – 100%

1.3 Location Information

The MC562 003 well is located in MC Block 562 (Lease OCS-G 19966) in a water depth of approximately 6,436 feet, approximately 90 ft southeast of the existing IS PLEM 1.

The Isabela Field (MC-562) is located in approximately 6,500-ft of water. The Isabela field was developed via subsea tie-back to the centrally located Na Kika "host" facility (MC-474).

Vicinity, Location and Bathymetry Plats are included in **Appendix B**.

Since BP proposes to use a dynamically positioned construction vessel there will be no anchors associated with this activity.

1.4 Safety and Pollution Prevention Features

No additional drilling operations will be conducted under this supplemental DOCD.

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 that will be used to conduct the operations proposed in this plan that will store oil, as defined in 30 CFR § 254.6, is provided in the table below. Only those tanks with a capacity of 25 barrels or more are included.

Storage Tanks Construction Vessel

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Number of Tanks	Total Capacity (bbls)	Fluid Gravity (API)
Fuel Oil	DP Flexible Lay Vessel	13,107	1	13,107	35

1.6 Pollution Prevention Measures

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

1.7 Additional Measures

Not conducting proposed activities that require reporting additional measures as per NTL 2008-04.

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
Supplemental Deepwater Operations Plan (SDWOP)	BSEE	Pending Submission
Revised Conservation Information Document (CID)	BOEM	Pending Submission
Lease Term Pipeline Application	BSEE	Pending Submission
Surface Commingling and Production Measurement (SCPM) Revision	BSEE	Pending Submission
Application for Permit to Drill (APD)	BSEE	Pending Submission
Application for Permit to Modify (APM) for Completions	BSEE	Pending Submission
NPDES Permit GMG-290110	EPA	Existing

2.2 Drilling Fluids

There are no drilling operations proposed in this supplemental DOCD.

2.3 Anticipated Production

2.3.1. Anticipated Production Table (MC562 003)

Type	Average Production Rate	Peak Production Rate	Life of Reservoir
Oil	Proprietary	Proprietary	12-years
Gas	Proprietary	Proprietary	12-years

2.4 Oil Characteristics

Fluid samples were gathered on pay reservoirs in the MC562_001ST01 well. The tables below are fluid data from the MC562_001ST01 well in the M55 reservoir, which is anticipated to be representative of production from MC562_003.

Reservoir Fluid Composition								
Flash Summary (9000 psia and 209 °F to 15.025 psia and 80 °F)								
	Gas-Oil Ratio	766	scf/stb	Vapor Gravity	0.836	(Air = 1.00)		
	FVF	1.434	Vsat/Vstd	API Gravity	28.9	°API @ 60 °F (Water Free)		
Component		Atmospheric Vapor	Atmospheric Liquid	Atmospheric Liquid	Molecular Weight	Specific Gravity	Reservoir Fluid	Reservoir Fluid
(Symbol / Name)		(mole%)	(mole %)	(wt %)		(Water = 1.0)	(mole %)	(wt %)
N_2	Nitrogen	0.583	0.000	0.000	28.01	0.809	0.368	0.094
CO_2	Carbon Dioxide	0.416	0.000	0.000	44.01	0.818	0.263	0.105
H_2S	Hydrogen Sulfide	0.000	0.000	0.000	34.08	0.801	0.000	0.000
C1	Methane	76.871	0.027	0.002	16.04	0.300	48.528	7.098
C2	Ethane	5.802	0.070	0.008	30.07	0.356	3.688	1.011
C3	Propane	6.679	0.410	0.071	44.10	0.507	4.367	1.756
iC4	i-Butane	1.228	0.226	0.051	58.12	0.563	0.858	0.455
nC4	n-Butane	3.609	1.052	0.239	58.12	0.584	2.666	1.413
iC5	i-Pentane	1.167	0.969	0.273	72.15	0.624	1.094	0.720
nC5	n-Pentane	1.453	1.940	0.546	72.15	0.631	1.633	1.074
C6	Hexanes	1.087	4.386	1.476	86.18	0.664	2.304	1.810
C7	Heptanes	0.701	6.942	2.569	94.60	0.708	3.003	2.590
C8	Octane	0.277	8.600	3.650	108.54	0.730	3.347	3.312
C9	Nonanes	0.085	6.916	3.280	121.43	0.757	2.605	2.883
C10	Decanes	0.042	6.554	3.430	134.19	0.778	2.444	2.990
C11	Undecanes		5.119	2.939	147.00	0.790	1.888	2.530
C12	Dodecanes		4.232	2.661	161.00	0.801	1.561	2.291
C13	Tridecanes		4.292	2.933	175.00	0.812	1.583	2.526
C14	Tetradecanes		3.837	2.847	190.00	0.823	1.415	2.452
C15	Pentadecanes		3.754	3.020	206.00	0.824	1.385	2.601
C16	Hexadecanes		4.167	3.612	222.00	0.821	1.537	3.111
C17	Heptadecanes		2.990	2.767	237.00	0.839	1.103	2.383
C18	Octadecanes		3.236	3.171	251.00	0.836	1.194	2.731
C19	Nonadecanes		2.408	2.473	263.00	0.858	0.888	2.130
C20	Eicosanes		1.998	2.145	275.00	0.863	0.737	1.848
C21	Heneicosanes		1.661	1.888	291.00	0.868	0.613	1.625
C22	Docosanes		1.484	1.767	305.00	0.873	0.547	1.522
C23	Triacosanes		1.367	1.698	318.00	0.878	0.504	1.462
C24	Tetracosanes		1.283	1.658	331.00	0.882	0.473	1.428
C25	Pentacosanes		1.162	1.565	345.00	0.886	0.429	1.348
C26	Hexacosanes		1.059	1.485	359.00	0.890	0.391	1.278
C27	Heptacosanes		1.035	1.512	374.00	0.894	0.382	1.302
C28	Octacosanes		1.012	1.533	388.00	0.897	0.373	1.320
C29	Nonacosanes		0.872	1.369	402.00	0.900	0.322	1.179
C30	Triacontanes		0.810	1.316	416.00	0.903	0.299	1.133
C31	Hentriacontanes		0.724	1.215	430.00	0.907	0.267	1.047
C32	Dotriacontanes		0.658	1.141	444.00	0.910	0.243	0.982
C33	Tritriacontanes		0.552	0.987	458.00	0.913	0.204	0.850
C34	Tetratriacontanes		0.559	1.031	472.00	0.915	0.206	0.887
C35	Pentatriacontanes		0.502	0.953	486.00	0.918	0.185	0.820
C36	Hexatriacontanes		0.456	0.891	500.00	0.920	0.168	0.767
C37	Heptatriacontanes		0.404	0.811	514.00	0.923	0.149	0.698
C38	Octatriacontanes		0.377	0.778	528.00	0.925	0.139	0.669
C39	Nonatriacontanes		0.388	0.822	542.00	0.927	0.143	0.707
C40	Tetracontanes		0.336	0.729	556.00	0.929	0.124	0.628
C41	Hentetracontanes		0.321	0.714	570.00	0.931	0.118	0.615
C42	Dotetracontanes		0.280	0.640	584.00	0.932	0.103	0.550
C43	Tritetracontanes		0.269	0.629	598.00	0.934	0.099	0.541
C44	Tetratetracontanes		0.244	0.582	612.00	0.936	0.090	0.502
C45	Pentatetracontanes		0.237	0.579	626.00	0.938	0.087	0.499
C46	Hexatetracontanes		0.214	0.534	640.00	0.941	0.079	0.461
C47	Heptatetracontanes		0.213	0.543	654.00	0.942	0.079	0.468
C48	Octactetracontanes		0.201	0.524	668.00	0.944	0.074	0.452
C49	Nonatetracontanes		0.201	0.537	682.00	0.945	0.074	0.461
C50+	Pentacontanes Plus		6.994	25.406	930.41	1.081	2.580	21.883
Total		100.000	100.000	100.000			100.000	100.000
Molecular Weight		24.12	256.09				109.68	

Table 1: M55 Reservoir Fluid Composition from MC562_001ST01

The black oil properties for the fluid samples from the MC562_001ST01well in reservoir M55, discussed above, are summarized in the table below.

Parameters	M55
API Gravity, Degrees @ 60°F	30.5
Gas Gravity @ 60°F and 14.7psig	0.738
Gas Oil Ratio, (scf/stb)	693
Oil Density @ Pr, Tr	0.767
Formation Volume Factor, (Vsat/V) @ Pr, Tr	1.285
Pour Point, (°F)	-8
Asphaltene Content, (Wt%)	7.2
Wax Appearance Temperature, (°F)	119
H_2S Content, (Wt%)	0
CO_2 Content, (Wt%)	0.105
Viscosity @ Pr, Tr (cp)	1.139

2.5 New or Unusual Technology

No new or unusual technology is proposed in this supplemental DOCD as defined by 30 CFR 550.200.

2.6 Bonding Information

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

2.7 Oil Spill Financial Responsibility (OSFR)

BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this supplemental DOCD according to 30 CFR Part 556, Subpart I, and NTL No. 2015-N04, and to the extent required under 30 CFR 556.901 and NTL No. 2016-N01.

2.8 Deepwater Well Control

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

2.9 Suspensions of Production

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

2.10 Blowout Scenario

BP will drill and complete the OCS-G 19966 Lease, Mississippi Canyon Block 562 Well 003 to the objective sand as outlined in the Geological and Geophysical Information Section under the Revised Exploration Plan (R-7040). The well will utilize a typical structural, conductor, surface and production casing program. In the event of a worst-case discharge scenario from a production standpoint, BP anticipates a peak production rate PROPRIETARY with an anticipated API gravity of 30.5°.

Spill response-related activities for the proposed activities under BP's DOCD are governed by the BP Regional Oil Spill Response Plan (OSRP) filed by BP America Inc. (Operator No. 21372) under cover letter dated February 14, 2019 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on March 15, 2019. Modifications were made to the approved OSRP under cover letter dated June 20, 2019 and confirmed in compliance by BSEE on July 24, 2019.

3 Geological and Geophysical Information

3.1 Geological Description

The geological description was submitted with the Exploration Plan Control No. R-7040 received by BOEM on October 22, 2020.

3.2 Structure Contour Maps

Structure Contour Maps were submitted with the Exploration Plan Control No. R-7040 received by BOEM on October 22, 2020.

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

Interpreted Seismic lines were submitted with the Exploration Plan Control No. R-7040 received by BOEM on October 22, 2020.

3.4 Geological Structure Cross-Section Maps

Geological structure cross sections were submitted with the Exploration Plan Control No. R-7040 received by BOEM on October 22, 2020.

3.5 Shallow Hazards Report

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

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

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

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

3.6 Shallow Hazards Assessment

Shallow hazards assessment (site clearance letters) that evaluate the seafloor and subsurface geologic and manmade features and conditions, for the proposed surface locations in Mississippi Canyon Block 562, Locations C and D (1 letter – location D is for the respud location) was included in the Exploration Plan R-7040, received by BOEM on October 22, 2020.

3.7 High Resolution Seismic Lines

High resolution seismic lines were submitted with the shallow hazards report referenced above and submitted with the Exploration Plan Control No. R-7040 received by BOEM on October 22, 2020.

4 Hydrogen Sulfide (H_2S) Information

Concentration

BP does not anticipate encountering H_2S while conducting the proposed operations under this plan.

4.1 Classification

In accordance with Title 30 CFR 250.490(c) the Bureau of Ocean Energy Management (BOEM) has classified the area in which the proposed operations are to be conducted in Mississippi Canyon Block 562 to be "H_2S absent" by approval letter dated June 21, 2018, for the Revised Exploration Plan (Control No. R-06704).

4.2 H2S Contingency Plan

According to NTL 2008-G04, this Section of the Plan is not applicable to the proposed operations due to "H2S absent" classification by approval letter dated June 21, 2018, for the Revised Exploration Plan (Control No. R-06704).

4.3 Modeling Report

According to NTL 2008-G04, this Section of the Plan is not applicable to the proposed operations due to "H2S absent" classification by approval letter dated June 21, 2018, for the Revised Exploration Plan (Control No. R-06704).

5 Mineral Resource Conservation Information

5.1 Technology and Reservoir Engineering Practices and Procedures

The MC562 003 well will have an open hole gravel pack horizontal completion in the M55 reservoir. Enhanced recovery techniques, such as water flooding or Enhanced Oil Recovery, will not be employed in the Isabela Field development due to limitations of the subsea development. Flowline gas lift is currently operational on the Isabela side of the Nakika Galapagos Oil Loop system.

The MC562 003 well is planned to be commingled with the other Isabela and Galapagos wells in the Galapagos Oil Loop system. MC562 003 will be operated in a similar manner as the other Isabela well with down-hole pressure gauges continuously recording pressure and temperature, fluid samples as required for optimization, and rate and pressure build-up tests performed routinely.

5.2 Technology and Recovery Practices and Procedures

The main recovery mechanism of M55 is expected to be aquifer drive combined with rock compaction. This new well will deploy a new completion type for the field, an open hole horizontal gravel pack. The horizontal well is strategically planned to delay water breakthrough by placing the lateral higher up in the pay column. It will also reduce draw down allowing the well to produce longer and drain a larger area. The recovery from the horizontal gravel pack is anticipated to be greater than the recovery from the existing producer due to the accessed drainage area.

5.3 Reservoir Development

The MC562 003 is going to penetrate M55 reservoir currently produced by the MC562-1 and MC562-2 wells. The offset wells have produced 20 MMBO. The M55 reservoir size is 184 MMBO, which is supported by static and dynamic data from the offset well performance. The recovery mechanism for Isabela M55 is weak aquifer combined with rock compaction drive based on offset well performance. The gross recoverable volume from M55 is expected to be 48 MMBO from the existing MC562-1 and MC562-2 wells and the new Isabela 3 well. The expected recovery factor from the reservoir is 26%.

6 Biological, Physical, and Socioeconomic 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 in order to judge the potential of the region for supporting high density chemosynthetic organisms. NTL No. 2009–G40, formalized the process. BP has conformed to this requirement and has located wells to avoid potential sites for benthic communities during the deepwater development project described by this plan.

MC 562 is located in water depths greater than 300-m; therefore, there is the potential for chemosynthetic organisms to be present. Shallow hazards assessments conducted for the project confirm that high density benthic communities are not found within the vicinity of the proposed wellbore and were submitted with the Revised Exploration Plan Control No. R-7040 received by BOEM on October 22, 2020

6.2 Biologically Sensitive Underwater Features and Areas

The proposed activities will be conducted in water depths of approximately 6,436-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 outside of the nearest Topographic Features, "No Activity Zones", Live Bottom (low Relief), and Live Bottom (Pinnacle Trend) Stipulation Blocks described in NTL 2009-G39 and shown on BOEM December 2012 Map: "Biologically Sensitive Areas (< 300-m)".

6.3 Remotely Operated Vehicle (ROV) Monitoring Survey Plan

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

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

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

The Sperm Whale, Giant Manta ray, oceanic whitetip shark and five species of sea turtles are the endangered or threatened species likely to occur in or near the lease area. The West Indian Manatee is thought to be remotely located away from the project area. 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, 2001). Critical habitat has been designated in southwest Florida.

The Bryde's whale (*Balaenoptera edeni*) is the only year-round resident baleen whale in the northern Gulf of Mexico. The Bryde's whale is most frequently sighted in the waters over the DeSoto Canyon between the 100 m (328 ft) and 400 m (3,280 ft) isobaths (Rosel et al., 2016; Hayes et al., 2018). Based on the available data, it is possible that Bryde's whales could occur in the project area although unlikely.

The distribution of sperm whales (*Physeter macrocephalus*), in the Gulf of Mexico is correlated with mesoscale physical features such as eddies associated with the Loop Current and may be present throughout the year (Jochens et al., 2008; Davis et al., 2000a). Results of a multi-year tracking study show female sperm whales are typically concentrated along the upper continental slope between the 200- and 1,000-m (656 and 3,280 ft) depth contours (Jochens et al., 2008).

According to the project specific EIA, excluding the endangered/threatened species mentioned above, there are an additional 20 species of marine mammals that may be found in the Gulf of Mexico. This includes dwarf and pygmy sperm whales, 4 species of beaked whales, and 14 species of delphinid whales (dolphins). The most common non-endangered cetaceans in the deepwater environment are small odontocetes such as the pantropical spotted dolphin, spinner dolphin, and bottlenose dolphin.

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 (2020a) and NOAA Fisheries (2020) are listed below and taken from Table 7 of **Appendix D**.

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Bryde's whale	*Balaenoptera edeni*	E	X	--	None
Sperm whale	*Physeter macrocephalus*	E	X	--	None
West Indian manatee	*Trichechus manatus*[1]	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T,E[2]	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)
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	None
Rough cactus coral	*Mycetophyllia ferox*	T	--	X	None
Lobed star coral	*Orbicella annularis*	T	--	X	None
Mountainous star coral	*Orbicella faveolata*	T	--	X	None
Boulder star coral	*Orbicella franksi*	T	--	X	None
Terrestrial Mammals					

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
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

Source: Project Specific EIA prepared by CSA Ocean Sciences Inc. November 2020
E = endangered; P = Proposed; T = threatened; X = potentially present; -- = not present.
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.
[2]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).

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

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

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

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 120 statute miles (193 km) north of the project area.

Mississippi Canyon Block 520 falls 7 miles outside Sargassum critical habitat designated for the loggerhead sea turtle. Additional information can be found in the Environmental Impact Analysis attached as **Appendix D.**

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

- Smalltooth Sawfish (*Pristis pectinata*)
- Gulf Sturgeon (subspecies *Acipenser oxyrinchus desotoi*)
- Giant manta ray (*Manta birostris*)
- Nassau grouper (*Epinephelus striatus*)
- Oceanic whitetip shark (Carcharhinus longimanus)

According to the EIA of Appendix D, the smalltooth sawfish (*Pristis pectinata*) is remote from the project area and highly unlikely to be affected.

The NMFS and United States Fish and Wildlife Service (USFWS) designated critical habitat for the Gulf sturgeon in fourteen geographic areas from Florida to Louisiana, encompassing spawning rivers and adjacent estuarine areas. Therefore, the Gulf Sturgeon is remote from the project area and highly unlikely to be affected.

Nassau groupers are found within the mainly in the shallow tropical and subtropical waters of eastern Florida, the Florida Keys, Bermuda, the Yucatan Peninsula, and the Caribbean, including the U.S. Virgin Island and Puerto Rico (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 (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).

Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude and now the species is only occasionally spotted in the GoM.

The giant manta ray is a highly migratory species that is thought to utilize the Flower Garden Banks serves as nursery habitat for aggregations of juvenile giant manta rays. Mature rays have also been observed in the Flower Garden Banks.

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

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

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

The EIA states that the Eastern Brown Pelican (Pelecanus occidentalis) was delisted from federal endangered status in 2009 (U.S. Fish and Wildlife Service, 2016b). However, this species remains listed as endangered by the state of Mississippi (Mississippi Natural Heritage Program, 2018). The Southern Bald Eagle (Haliaeetus leucocephalus) was delisted from its threatened status in the lower 48 states on 28 June 2007, but still receives protection under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act of 1940.

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

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

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

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

- elkhorn coral (*Acropora palmata*)

- staghorn coral (*Acropora cervicornis*)
- lobed star coral (*Orbicella annularis)*
- mountainous star coral (*Orbicella faveolata)*
- boulder star coral (*Orbicella franksi)*
- Pillar coral (Dendrogyra cylindrus)
- Rough cactus coral (Mycetophyllia ferox)

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

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

6.5 Archaeological Report

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

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

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

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 C**.

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 C.**

8 Air Emissions Information

8.1 Emissions Screening Questions

Screening Questions for DOCD's	Yes	No
Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formulas: CT = $3400D^{2/3}$ for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?		X
Do your emission calculations include any emission reduction measures or modified emission factors?		X
Does or will the facility complex associated with your proposed development and production activities process production from eight or more wells?	X	
Do you expect to encounter H_2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas in excess of the criteria set forth under 30 CFR 250.1105(a)(2) and (3)?		X
Do you propose to burn produced hydrocarbon liquids?		X
Are your proposed development and production activities located within 25 miles (40 kilometers) from shore?		X
Are your proposed development and production activities located within 124 miles (200 kilometers) of the Breton Wilderness Area?	X	

8.2 Air Emissions Summary

An emission workbook (BOEM Form 0139) showing Plan total emissions associated with the activities proposed in this revised Exploration Plan document is included in Attachment 1 in **Appendix E**. The complex total emissions are the same as Plan R-6910 AQR. That AQR is provided as Attachment 2 in **Appendix E.** The proposed total Plan emissions are summarized in the Table below. The proposed Total plan emissions are less than BOEM's emission exemption thresholds and as a result, no further review or controls are required.

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL			
BP Exploration & Production Inc.	562	OCS-G 19966	Nakika	003				

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2021	7.14	4.31	4.18	0.10	171.00	4.92	0.00	26.82	0.05
Allowable	2157.84			2157.84	2157.84	2157.84		54852.39	

8.3 Emissions Reductions Measures

There are no emission reduction measures applied for the Project Plan emissions.

8.4 Verification of Non-Default Emission Factors

The project BOEM 0139 Form emissions worksheet tab (EMISSIONS1) does not include non-default emission factors.

8.5 Distance to Shore for Emission Exemption Thresholds (EET)

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

8.6 Non-Exempt Facilities

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

8.7 Hydrogen Sulfide

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

8.8 Environmental Impact Analysis (EIA)

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

9 Oil Spill Information

9.1 Oil Spill Response Planning

9.1.1 Regional OSRP Information

Spill response-related activities for the proposed activities under BP's DOCD are governed by the BP Regional Oil

Spill Response Plan (OSRP) filed by BP America Inc. (Operator No. 21372) under cover letter dated February 14, 2019 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on March 15, 2019. Modifications were made to the approved OSRP under cover letter dated June 20, 2019 and confirmed in compliance by BSEE on July 24, 2019. Any spill from the vessel(s) conducting the activities covered by this DOCD would also be addressed by the vessel operator in accordance with the response plan of the vessel(s) from which the spill emanated.

9.1.2 Spill Response Site

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

9.1.3 OSRO Information

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

9.1.4 Worst-Case Scenario Determination

Category	Regional OSRP approved 7/24/2019 Production	Supplemental DOCD Production
Type of Activity	Production > 10 miles	Production > 10 miles
Facility Location	MC 822	MC 562
Facility Designation	Thunder Horse Well – MC 822-11	SS Well MC562 003
Distance to Nearest Shoreline	68-miles	64.87-miles
Volume Facility Storage:	0-bbls	0-bbls
Max Tanks /Vessels	42,000-bbls	0-bbls
Flowlines	8,000-bbls	0-bbls
Lease Term pipelines	13,000-bbls	40-bbls
Daily Production Volume	55,000-bbls	PROPRIETARY-bbls*

Volume Uncontrolled Blowout (Day 1)	0-bbls	0-bbls
Total Volume	118,000-bbls	40-bbls
Type of Oil(s) – (Crude Oil, Condensate, Diesel)	Crude	Crude
API Gravity(s)	33.0	30.5

*** Daily Production Volume not accounted for in total volume due to the pipeline system detection for shutdown response time assuming automatic shutdown = 3 minutes.**

BP has determined that the worst case scenario from the activities proposed in this plan does not supersede the worst case scenario in BP's GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated February 14, 2019, on behalf of several companies listed in the plan and approved by BSEE on March 15, 2019. Modifications were made to the approved OSRP under cover letter dated June 20, 2019 and confirmed in compliance by BSEE on July 24, 2019. Therefore, 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 March 15, 2019 , and since the worst-case scenario determined for this DOCD does not replace the appropriate worst-case scenario in our regional OSRP, BP hereby 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.

9.2 Oil Spill Response Discussion

Not conducting proposed activities that require reporting Oil Spill Response Discussion as per NTL 2008-04.

10 Environmental Monitoring and Mitigation Measures

10.1 Monitoring Systems

Operational personnel have been instructed to check for pollution frequently during their tour of duty and, in the event pollution is spotted, to identify and shut-off the source and make immediate notifications as per instructions provided in Section 8 of BP's certified OSRP. Also, in accordance with the measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion [*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)], 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.

10.2 Incidental Takes

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", NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program" and BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting". 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. Additionally, mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion [*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)] 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 BP's "Incident Notification and Investigation Procedure - Attachment 1".

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

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 2020 *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) 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 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.

12 Related Facilities and Operations Information

12.1 Related OCS Facilities and Operations

The Isabela 3 project consists of a single well subsea tie-back to the existing subsea facilities at the Galapagos (LSPS) Oil Loop, more specifically to the spare hub on IS PLEM 2. The Isabela 3 well will be drilled near Isabela 1 and 2, just outside of the Galapagos Oil Loop. The primary Isabela 3 top hole location is about 90 ft southeast of the existing IS PLEM 1. The Isabela 3 tree will be tied back to the existing IS PLEM 1 via a new rigid jumper. Power, hydraulics, and chemicals will be delivered from the existing Isabela infield umbilical to the Isabela 3 tree. Services will be taken from the existing far end UTA of the Isabela infield umbilical and re-routed appropriately via flying leads. A new subsea metering skid (SMS) will tie into the existing Isabela UTA via flying leads to route chemicals (AI, SI, CI) to the Isabela 3 tree.

Production from well MC562 003 will commingle with the other Isabela and Galapagos wells in the Galapagos Oil Loop system and will terminate at BP's existing Mississippi Canyon Area Block 474 A (Na Kika) FDPS, RUE OCS-G 23624. These incoming produced hydrocarbons will be separated and measured with the existing production processed at Na Kika.

The anticipated combined flow rates and shut-in times for the proposed pipeline are as follows:

Origination Point	Flow Rates	Shut-in Time
MC562 003	**PROPRIETARY**	**< 3 Minutes**

12.2 Transportation System

The Na Kika production will be transported by the existing export pipeline system.

Gas production from subsea wells produced to the Na Kika facility will continue to be measured for sales and royalty purposes on the Na Kika Mississippi Canyon Block 474 A Platform, a semisubmersible FDPS, prior to delivery to shore via Operations System DTN.

Liquid hydrocarbons from subsea wells produced to the Na Kika facility will continue to be measured for sales and royalty purposes using a LACT unit located on this same facility prior to delivery to shore via Operations System No. 51.1.

12.3 Produced Liquid Hydrocarbon Transportation Vessels

According to NTL 2008-G04, this Section of the Plan is not applicable to the proposed operations.

13 Support Vessels and Aircraft Information

13.1 General

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

13.2 Diesel Oil Supply Vessels

Not conducting proposed activities that require reporting Oil Spill Response Discussion as per NTL 2008-04.

13.3 Drilling Fluids Transportation

There are no drilling operations proposed in this supplemental DOCD.

13.4 Solid and Liquid Wastes Transportation

Information about the transportation of solid and liquid wastes generated by proposed activities has been included in **Appendix C**.

13.5 Vicinity Map

A vicinity map depicting the location of the proposed activities relative to the shoreline, the distance of the proposed activities from the shoreline, and the primary route(s) of the support vessels and aircraft when traveling between the onshore support facilities and the project areas is included in **Appendix B.** In accordance with Appendices A, B, C, and J of the 2020 *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), transit routes will avoid the Bryde's Whale area. As outlined in the table below, vessels will transit from shorebases in Louisiana and Mobile, AL 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. Mississippi Canyon Block 562 is located approximately 108.6 miles from the existing onshore support base located in Fourchon, Louisiana, as indicated on the vicinity map in **Appendix B.**

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

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

BP will primarily use the existing C-Port Fourchon Shorebase located in Fourchon, Terrebonne Parish, Louisiana to support general vessel operations. No expansion of these physical facilities is expected to result from the proposed revised activities. The C-Port Fourchon facility is located approximately 143-miles from the general activity area, provides a vehicle parking lot, office space, radio communication equipment, outside and warehouse storage space, crane, forklifts, water and fueling facilities, and boat dock space. The base is in operation 24-hours each day. Helicopters will be based out of Houma, Louisiana.

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

14.2 Support Base Construction or Expansion

Not conducting proposed activities that require reporting Oil Spill Response Discussion as per NTL 2008-04.

14.3 Waste Disposal

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

15 Coastal Zone Management Act (CZMA) Information

15.1 Consistency Certification

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

16 Environmental Impact Analysis (EIA)

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

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. Additionally, mitigation measures described in Appendices A, B, C and J of the 2020 [*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) will be implemented to the extent they are applicable to the activities outlined in this 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 GOMR exempt from public disclosure:

- Production rates and life of reservoirs
- Proprietary New or Unusual Technology

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:

Plan Control No	Lease	Blk	Operator Name	Operator Number	Plan Type Code	Received Date	Final Action Code	Final Action Date
R-7040	G19966	MC 562	BP Exploration & Production Inc	02481	EP	10/16/2020		
S-7019	G19966	MC 562	BP Exploration & Production Inc	02481	DOCD	08/20/2018	A	01/11/2019
R-6704	G19966	MC 562	BP Exploration & Production Inc	02481	EP	04/20/2018	A	06/25/2018

R-5061	G19966	MC 562	BP Exploration & Production Inc	02481	DOCD	8/18/2010	X	10/17/2011
N-9461	G19966	MC 562	BP Exploration & Production Inc.	02481	DOCD	11/9/2009	A	3/26/2010
R-4490	G19966	MC 562	BP Exploration & Production Inc.	02481	EP	1/30/2007	A	2/13/2007
N-8778	G19966	MC 562	BP Exploration & Production Inc.	02481	EP	7/6/2006	C	8/18/2006

17.3 Other Reference Items

[i]*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)

Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned.
BP America Inc, (BP), 2018, Site Clearance Letters, Proposed Well Location MC 562 "C" and "D" Block 562 OCS-G-19966 Mississippi Canyon Area, Gulf of Mexico, USA

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

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

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

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

17.4 Service Processing Fee

A receipt in the amount of $8,476.00 for the service processing fee as required by 30 CFR § 550.125 is included in **Appendix G**.

Appendixes

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

Appendix B: Vicinity, Location and Bathymetry Plats

Appendix C: Waste and Discharge Information

Appendix D: Environmental Impact Assessment

Appendix E: Air Emissions Information – Form BOEM-0139

Appendix F: Coastal Zone Management Certifications (AL)

Appendix G: Service Processing Fee

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

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

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

OCS PLAN INFORMATION FORM – Public Copy

General Information

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

Company Name: bp Exploration & Production Inc.	BOEM Operator Number: 02481
Address: 501 Westlake Park Blvd	Contact Person: Betsy Cleland
Houston, TX 77079	Phone Number: 281-773-9088
	E-Mail Address: Betsy.Cleland@bp.com

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

Project and Worst Case Discharge (WCD) Information

Lease(s): OCS-G 19966	Area: MC	Block(s): 562	Project Name (If Applicable): Isabela 3

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

Platform/Well Name: MC562 003	Total Volume of WCD: 12.65 MMSTBO	API Gravity: 30.5°
Distance to Closest Land (Miles): 64.4 statute miles	Volume from uncontrolled blowout: 170,000 STBO/day	

Have you previously provided information to verify the calculations and assumptions for your WCD?	X	Yes		No
If so, provide the Control Number of the EP or DOCD with which this information was provided	R-7040			
Do you propose to use new or unusual technology to conduct your activities?		Yes	X	No
Do you propose to use a vessel with anchors to install or modify a structure?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No

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

Proposed Activity	Start Date	End Date	No. of Days
Tree installation	07/15/2021	07/18/2021	3
Installation of jumper and subsea infrastructure	08/15/2021	09/12/2021	27
Commence Production from Isabela 3 well	09/15/2021	09/16/2021	1

Description of Drilling Rig

	Jackup		Drillship
	Gorilla Jackup		Platform rig
	Semisubmersible		Submersible
	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)
Isabela 3 well – MC 562	IS PLEM562	8.625”	50

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

<table>
<tr><th colspan="8">Proposed Well/Structure Location</th></tr>
<tr><td colspan="3">Well or Structure Name/Number (If renaming well or structure, reference previous name): MC562 (Loc. C formerly Loc. B-1)</td><td colspan="2">Previously reviewed under an approved EP or DOCD? R-7040</td><td>X Yes</td><td colspan="2">No</td></tr>
<tr><td colspan="2">Is this an existing well or structure?</td><td>Yes</td><td>X No</td><td colspan="2">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="2"></td></tr>
<tr><td colspan="5">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X Yes</td><td colspan="2">No</td></tr>
<tr><td>WCD info</td><td>For wells, volume of uncontrolled blowout (Bbls/day): 170,000</td><td colspan="3">For structures, volume of all storage and pipelines (Bbls): N/A</td><td>API Gravity of fluid</td><td colspan="2">30.5°</td></tr>
<tr><td></td><td>Surface Location</td><td colspan="3">Bottom-Hole Location (For Wells)</td><td colspan="3">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td>OCS-G 19966</td><td colspan="3"></td><td colspan="3">OCS
OCS</td></tr>
<tr><td>Area Name</td><td>Mississippi Canyon</td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td>Block No.</td><td>562</td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td>N/S Departure:
3,536.00 FNL</td><td colspan="3">N/S Departure:</td><td colspan="3">N/S Departure: F____L
N/S Departure: F____L
N/S Departure: F____L</td></tr>
<tr><td>E/W Departure:
5,394.00 FEL</td><td colspan="3">E/W Departure:</td><td colspan="3">E/W Departure: F____L
E/W Departure: F____L
E/W Departure: F____L</td></tr>
<tr><td rowspan="2">Lambert X-Y coordinates</td><td>X:
1,230,126.00’</td><td colspan="3">X:</td><td colspan="3">X:
X:
X:</td></tr>
<tr><td>Y:
10,324,144.00’</td><td colspan="3">Y:</td><td colspan="3">Y:
Y:
Y:</td></tr>
<tr><td rowspan="2">Latitude/ Longitude</td><td>Latitude
28° 26’ 36.027” N</td><td colspan="3">Latitude</td><td colspan="3">Latitude
Latitude
Latitude</td></tr>
<tr><td>Longitude
88° 16’ 37.512” W</td><td colspan="3">Longitude</td><td colspan="3">Longitude
Longitude
Longitude</td></tr>
<tr><td colspan="2">Water Depth (Feet):
6,436</td><td colspan="2">MD (Feet):</td><td>TVD (Feet):</td><td rowspan="2" colspan="2">MD (Feet):
MD (Feet):
MD (Feet):</td><td rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="3">Anchor Radius (if applicable) in feet:</td><td colspan="2">N/A</td></tr>
</table>

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

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

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): MC562 (Loc. D)		Previously reviewed under an approved EP or DOCD? R-7040	X	Yes		No
Is this an existing well or structure?	Yes	X No	If this is an existing well or structure, list the Complex ID or API No.			
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?			X	Yes		No

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

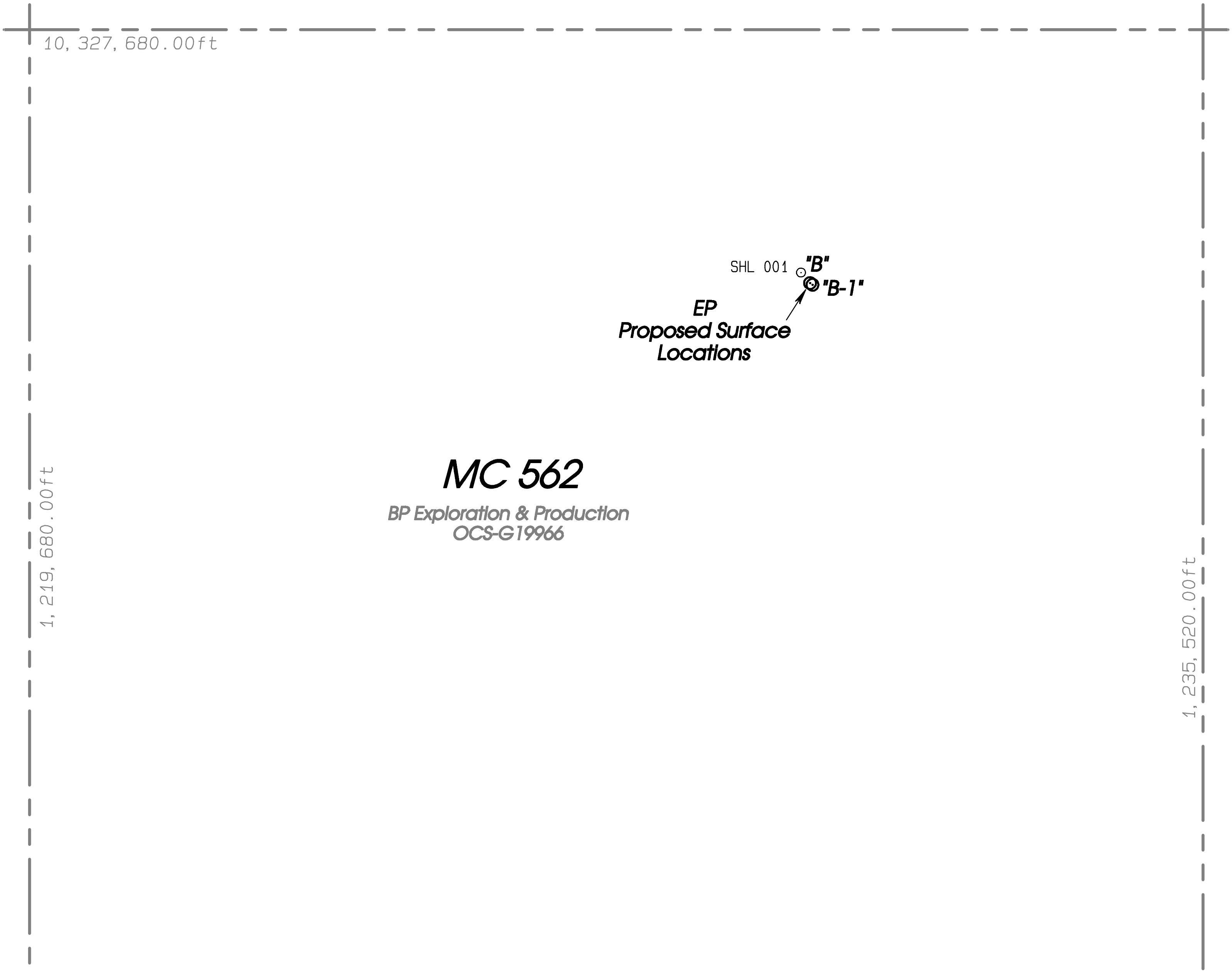
	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 19966		OCS OCS
Area Name	Mississippi Canyon		
Block No.	562		
Blockline Departures (in feet)	N/S Departure: 3,472.00 FNL	N/S Departure:	N/S Departure: F____L N/S Departure: F____L N/S Departure: F____L
	E/W Departure: 5,358.00 FEL	E/W Departure:	E/W Departure: F____L E/W Departure: F____L E/W Departure: F____L
Lambert X-Y coordinates	X: 1,230,162.00’	X:	X: X: X:
	Y: 10,324,208.00’	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 26’ 36.665” N	Latitude	Latitude Latitude Latitude
	Longitude 88° 16’ 37.117” W	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 6,436	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (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 =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	

Appendix B: Vicinity, Location and Bathymetry Plats



EP Proposed Surface Hole Locations:

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

10, 311, 840.00ft

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

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

Grid North

"Public Information"

BP EXPLORATION AND PRODUCTION

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

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

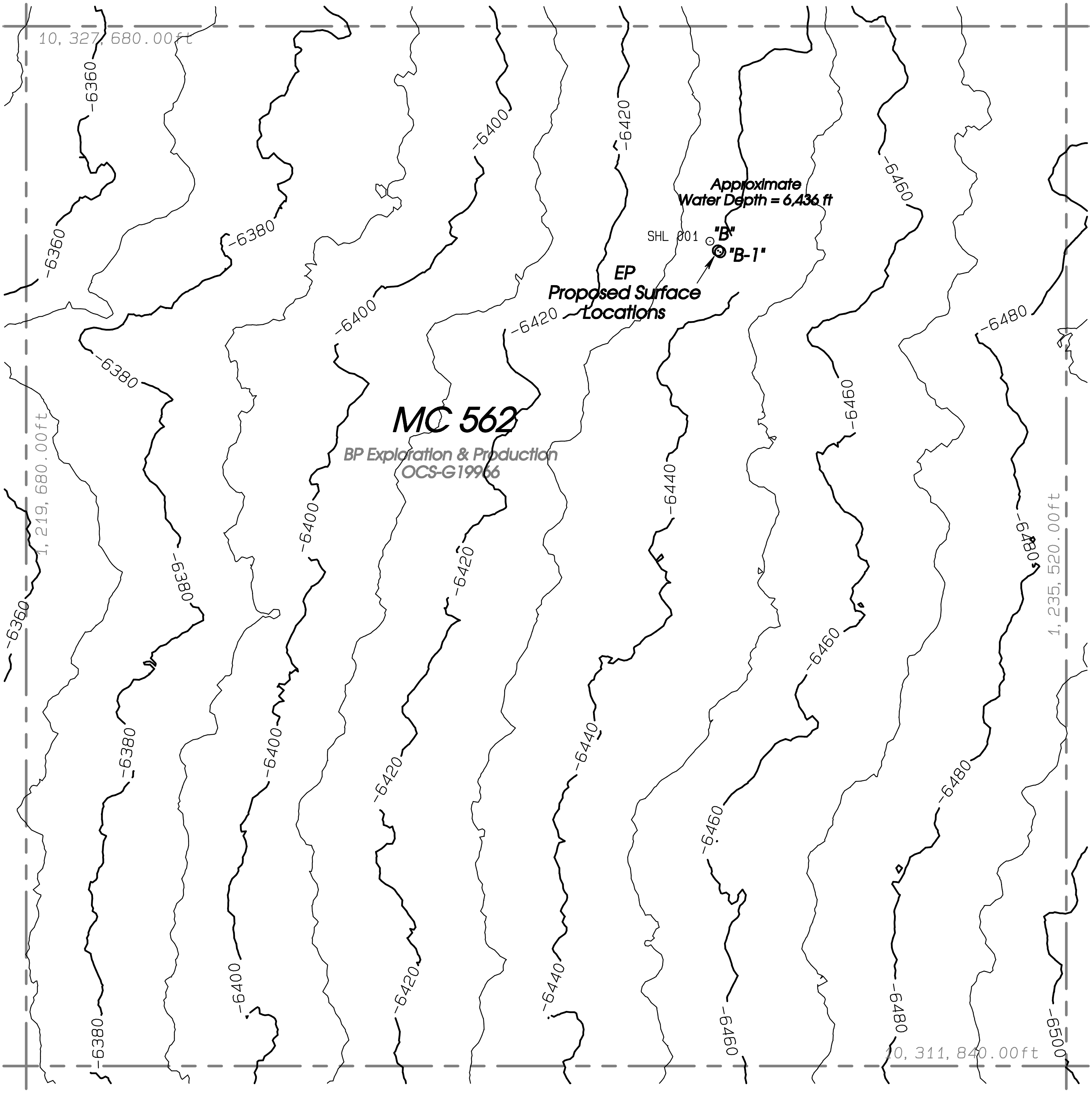
Plat prepared by: Robert M. Frost, PLS, Reservoir Development

Scale 1" = 2000 ft

Date: 13 March 2018

rmf

C:\Users\frosr0\OneDrive - BP\DellM4700_Cdrive\bda_drive\BP\1_GoM_Project_Work_files\ocs_g_mc\1_Active_Regulatory_Platting\rmf\MC562_No2_Isabela\MC562_No2_March2018.pro



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

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

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

Grid North

"Bathymetry"

BP EXPLORATION AND PRODUCTION

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

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

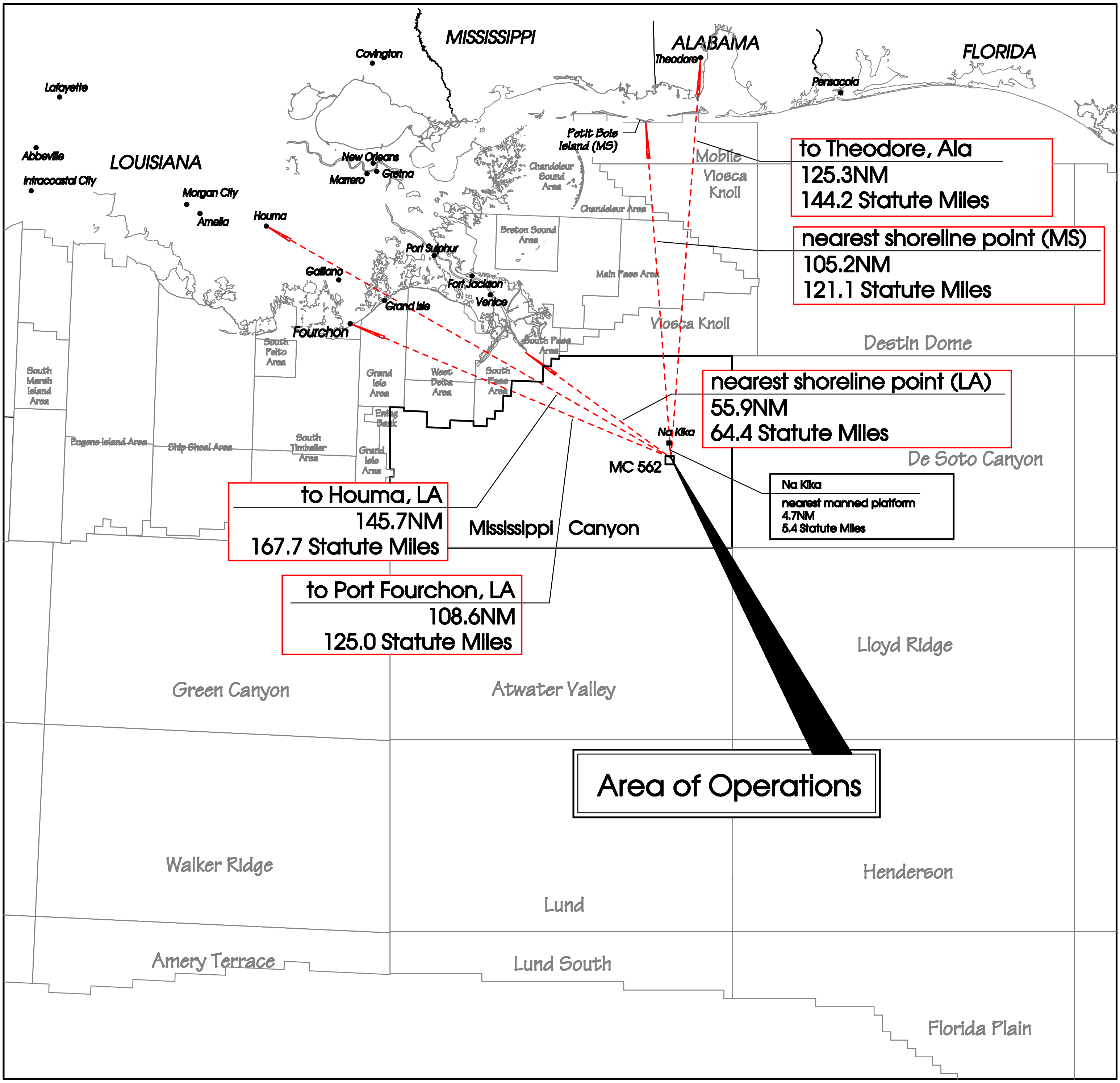
Plat prepared by: Robert M. Frost, PLS, Reservoir Development

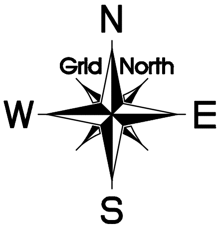
Scale 1" = 2000 ft

Date: 13 March 2018

rmf

C:\Users\frosr0\OneDrive - BP\DellM4700_Cdrive\bda_drive\BP\1_GoM_Project_Work_files\ocs_g_mc\1_Active_Regulatory_Platting\rmf\MC562_No2_Isabela\MC562_No2_March2018.pro





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

"VICINITY CHART"

bp

BP EXPLORATION AND PRODUCTION

Proposed EP Locations OCS-G19966 MC562 "B" and "B-1"

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

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

Scale 1" = 50 miles

Date: 13 March 2018

rmf

file: C:\Users\frosr0\OneDrive - BP\DellM4700_Cdrive\bda_drive\BP\1_GoM_Project_Work_files\ocs_g_mc\1_Active_Regulatory_Platting\rmf\MC562_No2_Isabela\MC562_No2_March2018_Vicinity.pro

Appendix C: Waste and Discharge Information

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

Isabela I3

Basis: Construction phase of the Isabela 3 project ONLY and will not cover rig operations. 5 Day Tree installation and 33 Day Jump Installation and commissioning.

Type of Waste	Composition	Projected Amount	Projected ocean discharges: Discharge Rate	Discharge Method	Projected Downhole Disposal: Answer yes or no
Will drilling occur ? If yes, you should list muds and cuttings					
Water Based Fluid	Spent drilling fluid drilling riserless hole plus pad mud to fill the hole	bbl/well	days @ #DIV/0! bbl/day	Seafloor	No
Cuttings wetted with Water Based Fluid	Water base interval	bbl/well	days @ #DIV/0! bbl/day	Seafloor	No
Excess Cement Slurry	Excess mixed cement, including additives & waste from equipment wash down after a cement operation	bbl/well	cmt jobs @ #DIV/0! bbl/cmt job	Surface	No
Cuttings wetted with Synthetic Based Fluid	Drill cuttings, cement cuttings, & synthetic base mud retained on cuttings	bbl/well	days @ #DIV/0! bbl/day	Surface	No
Small Volume Drilling Fluid Discharges associated with Cuttings	Displaced interfaces, accumulated solids in sand traps, pit clean-out solids, & centrifuge discharges made while changing the mud weight	bbl/well	days @ #DIV/0! bbl/day	Surface	No
Cement transfer losses	Bulk transfer between vessels	sks/well	events @ #DIV/0! sks/event	Surface	No
Barite transfer losses	Bulk transfer between vessels	sks/well	events @ #DIV/0! sks/event	Surface	No
Will humans be there? If yes, expect conventional waste					
Domestic Waste / Gray Water	Food waste, drainage from dishwasher, shower, laundry, bath, & washbasin drains	4,788 bbl/well	38 days @ 126 bbl/day	Surface	No
Sanitary Waste	Treated human body waste discharged from toilets & urinals	4,780 bbl/well	38 days @ 126 bbl/day	Surface	No
Is there a deck? If yes, there will be Deck Drainage					
Deck Drainage	Deck washdown & rain water	3,224 bbl/well	38 days @ 85 bbl/day (avg)	Surface	No
Will you conduct well treatment, completion, or workover?					
Well Treatment Fluids	Stimulations fluids including acids, solvents & propping agents	bbl/well	events @ 750 bbl/event	Surface	No
Completion Fluids	Salt solutions, weighted brines, polymers & various additives	bbl/well	days @ 60 bbl/day	Surface	No
Workover Fluids - If applicable	Salt solutions, weighted brines, polymers, & other speciality additives	bbl/well	days @ #DIV/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	6,840,000 bbl/well	38 days @ 1160 bbl/day	Surface	No
Blowout Preventer Fluid	Fluid used to actuate the hydraulic equipment on the BOP	bbl/well	events @ #DIV/0! bbl/event	N/A	N/A
Uncontaminated Ballast Water	Uncontaminated seawater added or removed to maintain proper draft	0 bbl/well	38 days @ 0 bbl/day (avg)	Surface	No
Uncontaminated Bilge Water	Water that collects in the vessels bilge	0 bbl/well	38 days @ 0 bbl/day (avg)	Surface	N/A
Cement discharged at seafloor	Excess mixed cement slurry	bbl/well	event @ bbl/day	Seafloor	No
Fire Water	Uncontaminated seawater/freshwater used for fire control	1,178 bbl/well	38 days @ 217 bbl/week	Surface	No
Cooling Water / Utility Water	Uncontaminated seawater	8,246 bbl/well	38 days @ 180,000 bbl/day	Surface	No
Sea Water / Fresh Water that has been Chemically Treated	Biocide, corrosion inhibitors, or other chemicals used to prevent corrosion or fouling of piping or equipment	bbl/well	event @ #DIV/0! bbl/event	Surface	No

Sub Sea Fluid Discharges	Wellhead Preservation, Hydrate Control, Umbilical Steel Tube Storage, Leak Tracer, & Riser Tensioner Fluids	bbl/well	event @ #DIV/0! bbl/event		N/A	N/A
Will you produce hydrocarbons? If yes fill in for produced water.						
Produced Water	Water brought up from hydrocarbon-bearing strata during extraction of oil & gas	0	days @ 0 bbl/day		N/A	N/A
Will you be covered by an individual or General NPDES permit ?		**GEG460000**				
NOTE: If you will not have a type of waste, enter NA in the row.		Red = Drlg Eng, Yellow = Completion Eng, Blue = Waste Specialist, Green = Calculator Tool				

PROVIDED BY Water SME:
Lerato Matlamela
PROVIDED BY DRILLING & COMPLETIONS ENGINEERS:
NA
Last Revision: 11/11/2020

TABLE of WASTES YOU WILL TRANSPORT AND/OR DISPOSE OF ONSHORE - Isabela 3

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

21 planned opertional days	Projected generated waste		Solid and Liquid Wastes transportation	Waste Disposal		
Type of Waste	**Composition**		**Transport Method**	**Name/Location of Facility**	**Amount (tons) (total for 60 days)**	**Disposal Method**
Will drilling occur? If yes, fill in the muds and cuttings.						
EXAMPLE: Synthetic-based drilling fluid or mud	*internal olefin, ester*		*Below deck storage tanks on offshore support vessels*	*Newport Environmental Services Inc., Ingleside, TX*	*X bbl/well*	*Recycled*
Oil-based drilling fluid or mud						
Synthetic-based drilling fluid or mud						
Cuttings wetted with Water-based fluid						
Cuttings wetted with Synthetic-based fluid						
Cuttings wetted with oil-based fluids						
Will you produce hydrocarbons? If yes fill in for produced sand.						
Produced sand						
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.						
EXAMPLE: trash and debris (recylables)	*Plastic, paper, aluminum*		*barged in a storage bin*	*ARC, New Iberia, LA*	*X tons*	*Recycled*
Chemical product wastes	Pills, spacers, additives etc.	***BP owned***	Barged in (totes)	River Birch Landfill, Avondale, LA	0.0	Recycle / Landfill / Incineration
Domestic waste	Municipal trash	***Contractor owned***	Barged in (supersacks)	River Birch Landfill, Avondale, LA	1.0	Landfill
Excess cement	Excess cement from vessel tank cleaning	***BP owned***	Transported by vehicle (supersacks)	Grand Isle Port Commission or River Birch landfill	0.0	Reuse / Landfill
Recyclables	Plastic, paper, aluminum	***Contractor owned***	Barged in (supersacks)	Recycle the Gulf ARC, Iberia, LA	14.0	Recycle
Scrap Metal	Scrap piping, grating and other metals	***Contractor owned***	scrap piping, grating and other metals	Barged in (scrap baskets)	0.0	Recycle
Trash and debris	Municipal trash	***Contractor owned***	Barged in (supersacks)	River Birch Landfill, Avondale, LA	20.0	Landfill
Universal Waste- these are contractor owned, not BP	Batteries	***Contractor owned***	Barged in (DOT drums)	L&L Oil and Gas Services, Fourchon, LA	0.0	Recycle
Universal Waste- these are contractor owned, not BP	Fluorescent light bulbs	***Contractor owned***	Barged in (DOT drums)	L&L Oil and Gas Services, Fourchon, LA	0.0	Recycle
Used oil	Used oil, hydraulic oil	***BP owned***	Barged in (DOT drums)	Omega Waste Management, Patterson, LA	32.0	Recycle
Vessel Maintenance Wastes (non hazardous) - these are contractor owned, not BP	Oily rags, pads, oil filters etc.	***Contractor owned***	Barged in (drums or totes)	LEI	0.0	Recycle
Vessel Maintenance Wastes (painting, blasting) - these are contractor owned, not BP	Paint thinner, paint chips, blast media, aerosol cans	***Contractor owned***	Barged in (drums or totes)	Chemical Waste Management, Sulphur, LA	0.0	Incineration / Landfill
Wash water		***BP owned***	Barged in (totes)	River Birch Landfill, Avondale, LA	25.0	Disposal

NOTE: If you will not have a type of waste, enter NA in the row.

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

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

Mad Dog Ph2 Suction piles" (30 days / installation)	Projected generated waste	Solid and Liquid Wastes transportation	Waste Disposal		
Type of Waste	**Composition**	**Transport Method**	**Name/Location of Facility**	**Amount**	**Disposal Method**
Will drilling occur ? If yes, fill in the muds and cuttings.					
EXAMPLE: Synthetic-based drilling fluid or mud	*internal olefin, ester*	*Below deck storage tanks on offshore support vessels*	*Newport Environmental Services Inc., Ingleside, TX*	*X bbl/well*	*Recycled*
Oil-based drilling fluid or mud	**NA**				
Synthetic-based drilling fluid or mud	**NA**				
Cuttings wetted with Water-based fluid	**NA**				
Cuttings wetted with Synthetic-based fluid	**NA**				
Cuttings wetted with oil-based fluids	**NA**				
Will you produce hydrocarbons? If yes fill in for produced sand.					
Produced sand	NA				
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.					
EXAMPLE: trash and debris (recylables)	*Plastic, paper, aluminum*	*barged in a storage bin*	*ARC, New Iberia, LA*	*X lb/well*	*Recycled*
Chemical product wastes	Pills, spacers, additives etc.	Barged in (totes)	River Birch Landfill, Avondale, LA	**NA**	Disposal
Domestic waste	Municipal trash	Barged in (supersacks)	River Birch Landfill, Avondale, LA	**0.1 ton**	Disposal
Excess cement	Excess cement from vessel tank cleaning	Transported by vehicle (supersacks)	Grand Isle Port Commission or River Birch landfill	**NA**	Disposal
Recyclables	Plastic, paper, aluminum	Barged in (supersacks)	Recycle the Gulf ARC, Iberia, LA	**2.8**	Recycled
Scrap Metal	Scrap piping, grating and other metals	scrap piping, grating and other metals	Barged in (scrap baskets)	**NA**	Recycled
Trash and debris	Municipal trash	Barged in (supersacks)	River Birch Landfill, Avondale, LA	**2.6 tons**	Disposal
Universal Waste	Batteries	Barged in (DOT drums)	L&L Oil and Gas Services, Fourchon, LA	**NA**	Recycled
Universal Waste	Fluorescent light bulbs	Barged in (DOT drums)	L&L Oil and Gas Services, Fourchon, LA	**NA**	Recycled
Used oil	Used oil, hydraulic oil	Barged in (DOT drums)	Omega Waste Management, Patterson, LA	**3.1 tons**	Recycled
Vessel Maintenance Wastes (non hazardous)	Oily rags, pads, oil filters etc.	Barged in (drums or totes)	River Birch Landfill, Avondale, LA	**0.1 tons**	Disposal
Vessel Maintenance Wastes (painting, blasting)	Paint thinner, paint chips, blast media, aerosol cans	Barged in (drums or totes)	Chemical Waste Management, Sulphur, LA	**0.1 tons**	Disposal
Wash water		Barged in (totes)	River Birch Landfill, Avondale, LA	**2.5 tons**	Disposal

NOTE: If you will not have a type of waste, enter NA in the row.

Appendix D: Environmental Impact Assessment

Environmental Impact Analysis

for a

DEVELOPMENT OPERATIONS COORDINATION DOCUMENT
for
Mississippi Canyon Block 562 (OCS-G-19966)
Offshore Alabama

November 2020

Prepared for:

BP Exploration & Production Inc.
501 Westlake Park Boulevard
Houston, Texas 77079-2696

Prepared by:

CSA Ocean Sciences Inc.
8502 SW Kansas Avenue
Stuart, Florida 34997
Telephone: (772) 219-3000

Contents

Contents
(Continued)

List of Tables

List of Figures

Acronyms and Abbreviations

§	section
µPa	micropascal
ac	acre
ADIOS2	Automated Data Inquiry for Oil Spills 2
AUV	autonomous underwater vehicle
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 Coordination 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*
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
MC	Mississippi Canyon
MC 562	Mississippi Canyon Block 562
MMC	Marine Mammal Commission
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
NAAQS	National Ambient Air Quality Standards
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRDA	Natural Resource Damage Assessment
NTL	Notice to Lessees and Operators
NWR	National Wildlife Refuge
OCS	Outer Continental Shelf
OSRA	Oil Spill Risk Analysis
OSRP	Oil Spill Response Plan
PAH	polycyclic aromatic hydrocarbons
PM	particulate matter
PSD	Prevention of Significant Deterioration
re	referenced to
SEL_{cum}	cumulative sound exposure level
SEMS	Safety and Environmental Management system
SMS	subsea metering skid
SO_x	sulfur oxides
SPL	sound pressure level
SPL_{rms}	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
VGP	USEPA Vessel General Permit
VOC	volatile organic compound
WCD	worst case discharge

Introduction

BP Exploration & Production Inc. (bp) is submitting a Development Operations Coordination Document (DOCD) for Mississippi Canyon (MC) Block 562 (MC 562), Gulf of Mexico, Outer Continental Shelf (OCS)-G19966. Under this DOCD, bp proposes to install a single tie-back from the Isabela-3 well to a spare hub at the existing subsea facilities at the Galapagos oil loop. The well will be tied back to the existing Isabela pipeline end manifold via a rigid jumper of 18 to 30 m (60 to 100 ft). A new subsea metering skid (SMS) will tie into the existing Isabela umbilical termination assembly via flying leads to route hydraulics and chemicals to the Isabela-3 subsea tree. Chemical metering will be configured in the SMS to share chemicals between the Isabela-2 and Isabela-3 wells. The installation activities will occur in MC 562. 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.

MC 562 is located within the Central Gulf of Mexico OCS Planning Area, approximately 64 statute miles (103 kilometers [km]) from the nearest shoreline (Plaquemines Parish, Louisiana), 125 statute miles (201 km) from the regional onshore support base (Port Fourchon, Louisiana), and 168 statute miles (270 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed activities is approximately 1,962 m (6,436 ft). A dynamically positioned (DP) construction vessel is anticipated to be on site for approximately 3 days for subsea tree installation and 18 days for installation and commissioning in the third quarter of 2021.

The EIA for this DOCD was prepared for submittal to the Bureau of Ocean Energy Management (BOEM) in accordance with applicable regulations, including Title 30 Code of Federal Regulations (CFR) § 550.242(s) and § 550.261. The EIA is a project- and site-specific analysis of the potential environmental impacts of bp's planned activities. The EIA complies with guidance provided in existing Notices to Lessees and Operators (NTLs) issued by BOEM and its predecessors, Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), including NTLs 2008-G04 (extended by 2015-N02 and partially amended by 2020-G01) 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; 2014; 2015; 2016b; 2017a). The most recent multisale EIS contains updated environmental baseline information in light of the Macondo (*Deepwater Horizon*) incident and addresses potential impacts of a catastrophic spill (BOEM, 2012a; b; 2013; 2014; 2015; 2016b; 2017a). The 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 from those documents are incorporated here by reference.

Oil spill response-related proposed activities under this DOCD are governed by the bp Regional Oil Spill Response Plan (OSRP), as filed by BP America Inc. (Operator No. 21372) under cover letter dated 14 February 2019. The OSRP was filed on behalf of several affiliated companies, including BP Exploration & Production Inc. (Operator No. 02481) and approved by the Bureau of Safety and Environmental Enforcement (BSEE) on 15 March 2019. Modifications were made to the approved OSRP under cover letter dated 20 June 2019 and confirmed in compliance by BSEE 24 July 2019. 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 DOCD, 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. 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). 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.

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

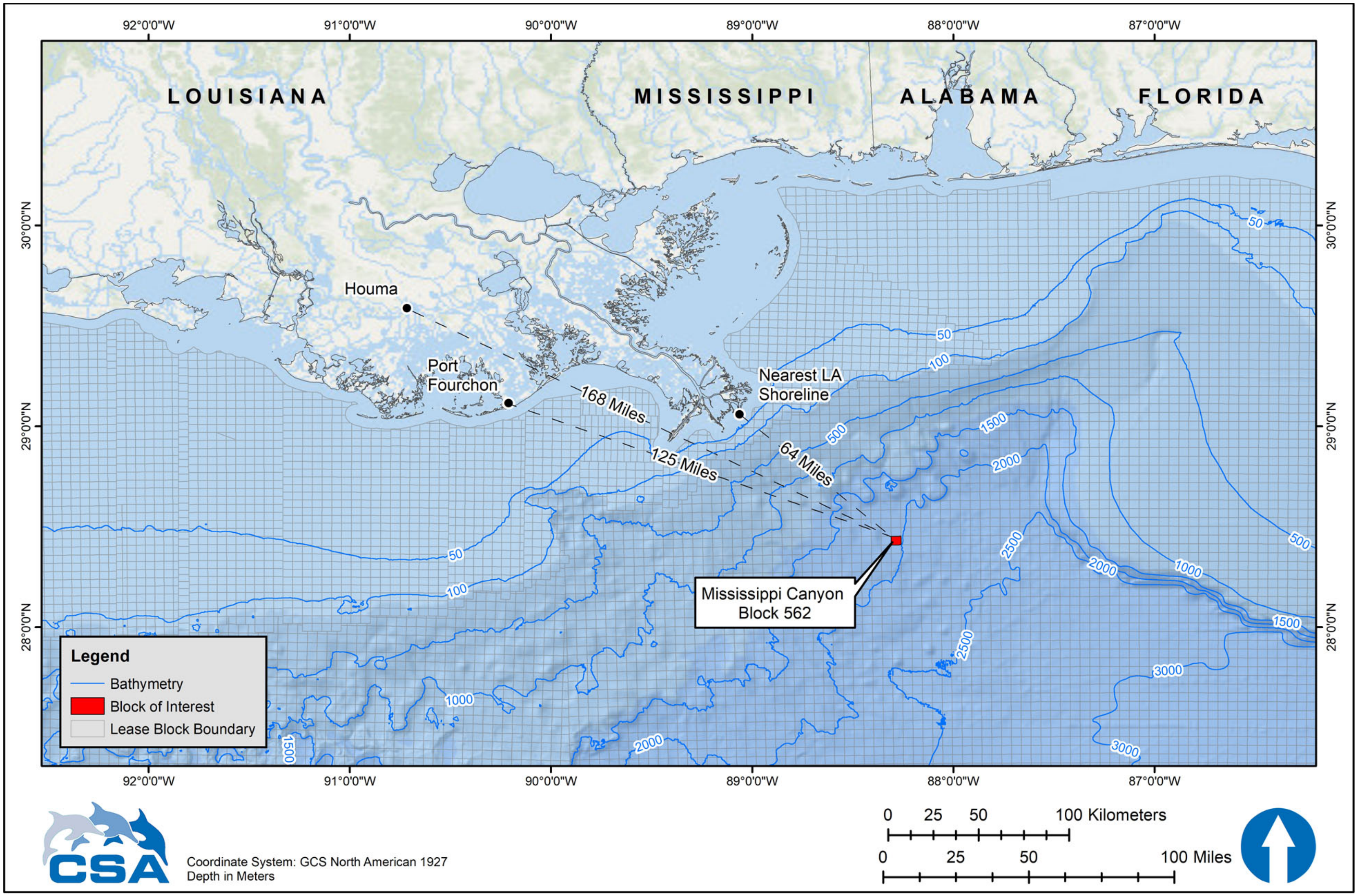


Figure 1.   Location of Mississippi Canyon Block 562.

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

NTL	Title	Summary
BOEM-2020-G01	Air Quality Information Requirements for Exploration Plans, Development Operations Coordination Documents, and Development and Production Plans in the Gulf of Mexico Region	Cancels and supersedes the air emission information portion of NTL 2008-G04, Information Requirement for Exploration Plans and Development Operations Coordination Documents, effective date 5 May 2008.
BOEM-2016-G01 or Appendix C (NMFS, 2020a)	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 National Marine Fisheries Service (NMFS) Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.
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.
BSEE-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 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.

Table 1. (Continued).

NTL	Title	Summary
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 the Bureau of Ocean Energy Management will be evaluating whether each operator has submitted adequate information demonstrating that it has access to and can deploy containment resources to respond promptly to a blowout or other loss of well control.
2009-G40	Deepwater Benthic Communities	Provides guidance for avoiding and protecting high-density deepwater benthic communities (including chemosynthetic and deepwater coral communities) from damage caused by OCS oil and gas activities in water depths greater than 300 m (984 ft). Prescribes separation distances of 610 m (2,000 ft) from each mud and cuttings discharge location and 76 m (250 ft) from all other seafloor disturbances.
2009-G39	Biologically Sensitive Underwater Features and Areas	Provides guidance for avoiding and protecting biologically sensitive features and areas (i.e., topographic features, pinnacles, low relief live bottom areas, and other potentially sensitive biological features) when conducting OCS operations in water depths less than 300 m (984 ft) in the Gulf of Mexico.
2008-G04	Information Requirements for Exploration Plans and Development Operations Coordination Documents	Provides guidance on information requirements for OCS plans, including EIA requirements and information regarding compliance with the provisions of the Endangered Species Act and Marine Mammal Protection Act.
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 October 9, 2019 and to rescind NTL 2011-JOINT-G01.

A. Impact-Producing Factors

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

- Construction 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 Construction Vessel Presence, Marine Sound, and Lights

The activities proposed in this DOCD will be completed using a DP construction vessel. DP vessels use a global positioning system (GPS), specific computer software, and sensors in conjunction with a series of thrusters to maintain position. Through satellite navigation and position reference sensors, the location of the vessel is precisely monitored while thrusters, positioned at various locations about the rig pontoons, are activated to maintain position. This allows operations at sea in areas where mooring or anchoring is not feasible. Consequently, there will be no anchoring in MC 562 during this project. The selected construction vessel is anticipated to be on site for approximately 3 days for subsea tree installation and approximately 18 days for installation and commissioning in the third quarter of 2021. The construction 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 construction vessel include the physical presence of the vessel in the ocean, entanglement and entrapment from moon pools and equipment in the water, working and safety lighting on the vessel, and underwater sound produced during operations.

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

Environmental Resources	Impact-Producing Factors									
	Construction 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 Hydrocarbon Spill
Physical/Chemical Environment										
Air quality	--	--	--**X**(9)	--	--	--	--	--	**X**(6)	**X**(6)
Water quality	--	--	--	**X**	--	--	--	--	**X**(6)	**X**(6)
Seafloor Habitats and Biota										
Soft bottom benthic communities	--	**X**	--	--	--	--	--	--	--	--
High-density deepwater benthic communities	--	--(4)	--	--(4)	--	--	--	--	--	--
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)
Bryde'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)
Threatened coral	--	--	--	--	--	--	--	--	--	**X**(6)
Coastal and Marine Birds										
Marine birds	**X**	--	--	--	--	--	--	**X**	**X**(6)	**X**(6)
Coastal Birds	--	--	--	--	--	--	--	**X**	--	**X**(6)
Fisheries Resources										
Pelagic communities and ichthyoplankton	**X**	--	--	**X**	**X**	--	--	--	**X**(6)	**X**(6)
Essential Fish Habitat	**X**	--	--	**X**	**X**	--	--	--	**X**(6)	**X**(6)
Archaeological Resources										
Shipwreck sites	--	--(7)	--	--	--	--	--	--	--	**X**(6)
Prehistoric archaeological sites	--	--(7)	--	--	--	--	--	--	--	**X**(6)
Coastal Habitats and Protected Areas										
Coastal habitats and protected areas	--	--	--	--	--	--	--	**X**	--	**X**(6)

Table 2. (Continued).

Environmental Resources	Impact-Producing Factors									
	Construction 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 Hydrocarbon Spill
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.

Table 2 Footnotes and Applicability to this Program:

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

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

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

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

(4) *Activities on blocks designated by the BOEM as being in water depths 400 m or greater.*
   - No impacts 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 2,000 ft (610 m) of the proposed activity locations (bp, 2020).

(5) *Exploration or production activities where Hydrogen Sulfide (H_2S) concentrations greater than 500 ppm might be encountered.*
   - The lease block is classified as H_2S absent.

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

(7) *All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or prehistoric site that no impact would occur, the EIA can note that in a sentence or two.*
   - No impacts to archaeological resources are expected. While MC 562 is on the list of high-probability blocks for shipwrecks (BOEM, 2011), the project area is well beyond the 60-m depth contour used by BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of Mexico. The site clearance letter (bp, 2020), reported that no archaeologically significant sonar contacts were identified within 2,000 ft (610 m) of the proposed activities.

(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 construction 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 construction 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. Infrastructure installation operations produce underwater sounds that may impact certain marine resources. Sources of installation-related sounds include, for example, DP thrusters, remotely operated vehicle (ROV) operations, and seabed mounted active acoustics (such as ultra-short baseline systems) for positioning. Only sound related to DP thruster activity is expected to produce sound at levels which could result in potential impacts on marine life.

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.

The construction vessel operations and equipment can be expected to produce sound associated with propulsion machinery that transmits directly to the water during station keeping, installation, 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 vessel (Richardson et al., 1995). Source levels produced by DP vessels for station-keeping are largely dependent on thruster size and the level of thruster activity, thruster size, and power required to keep position and, therefore, vary based on local ocean currents, sea and weather conditions, and operational requirements. Representative source levels for vessels in DP activities range from 184 to 190 dB re 1 µPa m, with a primary frequency below 600 Hz (Blackwell and Greene Jr., 2003; McKenna et al., 2012; Kyhn et al., 2014).

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).

A.2 Physical Disturbance to the Seafloor

In water depths of 600 m (1,969 ft) or greater, DP construction vessels disturb only a very small area of the seafloor in the immediate vicinity of where seafloor infrastructure will be placed. BOEM (2012a) estimated an area of seafloor disturbance between 1.2 acres (ac) (0.5 hectares [ha]) and 2.5 ac (1.0 ha) per kilometer of pipeline and/or flowline installation. Due to the water depth in the project area, it is anticipated that the umbilicals and flying leads will not be buried by trenching but will instead be placed on the seafloor, decreasing the area of impact.

A.3 Air Pollutant Emissions

The air pollutant emissions are calculated in accordance with BOEM requirements for screening air impacts and summarized in the Air Quality Emissions Report in DOCD Section 8. The primary air pollutants typically associated with OCS activities are suspended particulate matter ($PM_{2.5}$

and PM_{10}), ammonia, lead, sulfur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO) (Reşitoğlu et al., 2015). These emissions occur mainly from combustion diesel and aviation fuel, also known as Jet-A.

The Air Quality Emissions Report demonstrates that the projected emissions are below exemption levels set by the applicable regulations in 30 CFR § 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants.

A.4 Effluent Discharges

Effluent discharges are summarized in DOCD Section 7. All offshore discharges are expected to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit issued by the U.S. Environmental Protection Agency (USEPA) and/or the USEPA Vessel General Permit (VGP), as well as any applicable U.S. Coast Guard (USCG) regulations.

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

Under certain circumstances, the construction 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 construction activities. During these limited times of safe zone harboring, incidental vessel discharges may occur. These discharges are expected to be within the limits represented in the waste and water discharge table estimates submitted as part of this DOCD.

A.5 Water Intake

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

A.6 Onshore Waste Disposal

A list of the solid and liquid wastes generated during this project to be disposed of onshore are tabulated in DOCD Section 7.1. Typical waste streams requiring onshore disposal from a project of this nature include the following:

- Vessel washwater;
- Vessel maintenance wastes (hazardous and non-hazardous);
- Used oil (e.g., lube oil, hydraulic oil, glycol);
- Domestic (e.g., municipal trash) and universal wastes (e.g., batteries, florescent light bulbs);
- Nonhazardous domestic recyclables (e.g., plastic, paper, aluminum);
- Scrap metal;
- Radioactive waste; and
- Miscellaneous unused chemicals.

These waste streams are expected to be segregated on the construction vessel and transported to shore for disposal in an appropriately permitted facility. Compliance with established practices and procedures is expected to result in either no or negligible impacts from this factor.

A.7 Marine Debris

bp and its contractors intend to comply with all applicable regulations relating to solid waste handling, transportation, and disposal, including the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) Annex V requirements, and USEPA, USCG, BSEE, and BOEM regulations. These regulations include prohibitions and compliance requirements regarding the deliberate discharging of containers and other similar materials (i.e., trash and debris) into the marine environment as well as the protective measures to be implemented to prevent the accidental loss of solid material into the marine environment. For example, BSEE regulations 30 CFR § 250.300(a) and (b)(6) prohibit operators from deliberately discharging containers and other similar materials (i.e., trash and debris) into the marine environment, and 30 CFR § 250.300(c) requires durable identification markings on equipment, tools, containers (especially drums), and other material. The USEPA and USCG regulations require operators to be proactive in avoiding accidental loss of solid materials by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. 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). bp is expecting to comply with NTL BSEE-2015-G03, which instructs operators 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. Each factor is discussed below.

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

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

A helicopter will make approximately seven round trips per week between the construction 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. Support vessel and aircraft fuel capacity and trip frequency or duration in Mississippi Canyon Block 562 during the proposed project.

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

gal = gallons; bbl = barrel.

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 of 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 hydrocarbon spill, up to and including the WCD for this DOCD.

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

Recent EISs (BOEM, 2012a, b, 2013, 2014, 2015, 2016b, 2017a, b) analyzed other types of accidents relevant to offshore oil and gas operations that could lead to potential impacts to the marine environment. Vessel collisions, dropped objects, chemical spills, and a hydrogen sulfide (H_2S) release are discussed briefly below.

Vessel Collisions. BSEE data show that there were 171 OCS-related collisions between 2007 and 2018 (BSEE, 2018). Most collision mishaps are the result of service vessels colliding with platforms or vessel collisions with pipeline risers. Approximately 10% of vessel collisions with platforms in the OCS resulted in diesel spills, and in several collision incidents, fires resulted from hydrocarbon releases. To date, the largest diesel spill associated with a collision occurred in 1979 when an anchor-handling boat collided with a drilling platform in the Main Pass lease area, spilling 1,500 barrels (bbl). Diesel fuel is the product most frequently spilled, but oil, natural gas, corrosion inhibitor, hydraulic fluid, and lube oil have also been released as the result of vessel collisions. Human error accounted for approximately half of all reported vessel collisions from 2006 to 2009. As summarized by BOEM (2017a), vessel collisions occasionally occur during routine operations. Some of these collisions have caused spills of diesel fuel or chemicals. 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 the DP construction vessel could potentially pose a risk to existing live subsea pipelines or other infrastructure. If a dropped pipe or other subsea equipment landed on existing seafloor infrastructure, loss of integrity of seafloor pipelines, umbilicals, etc. could result in a spill. Dropped objects could also result in seafloor disturbance and potential impacts to benthic communities. bp and its contractors intend to comply with all BOEM and BSEE safety requirement 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 offshore oil and gas development operations. The relative quantities of their use is reflected in the largest volumes spilled (BOEM, 2017b). Completion, workover, and treatment fluids are the largest quantity used and comprise the largest releases. Any potential leak due to pressure testing failure will be limited to a single line leak and would be limited to less than 1bbl. Potentially spilled fluids include Transaqua HT, MEG 50/50, or methanol. Between 2007 and 2014, an average of two chemical spills <50 bbl in volume and three chemical spills >50 bbl in volume occurred each year (BOEM, 2017a).

H_2S Release. MC 562 is classified as H_2S absent. Based on the H_2S absent classification, no further discussion on H_2S impacts is warranted.

A.9.1 Small Fuel Spill

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

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

The water-soluble fractions of diesel are dominated by two- and three-ringed polycyclic aromatic hydrocarbons (PAHs), which are moderately volatile (National Research Council, 2003a). The constituents of these oils are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. Due to its light density, diesel will not sink to the seafloor. Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high suspended solids loads (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico. Diesel fuel is readily and completely degraded by naturally occurring microbes (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 was estimated using the National Oceanic and Atmospheric Administration's (NOAA) Automated Data Inquiry for Oil Spills 2 (ADIOS2) model (NOAA, 2016a). This model uses the physical properties of oils in its database to predict the rate of evaporation and dispersion over time as well as changes in the density, viscosity, and water content of the product spilled. It is estimated that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it during this 24-hour period would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

The ADIOS2 results, coupled with spill trajectory information discussed below for a large spill, indicate that a small fuel spill would not impact coastal or shoreline resources. The project area is 64 statute miles (103 km) from the nearest shoreline (Plaquemines Parish, Louisiana). Slicks from small fuel spills are expected to persist for relatively short periods of time ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl) and rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a). Because of the distance 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. DOCD Appendix G provides a discussion of bp's response efforts if a spill were to occur during operational activities associated with the proposed DOCD.

Weathering. Following a diesel fuel spill, several physical, chemical, and biological processes, collectively called weathering, interact to change the physical and chemical properties of the diesel, and thereby 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 Regional OSRP, which meets the requirements contained in 30 CFR Part 254.

A.9.2 Large Hydrocarbon Spill (Worst Case Discharge)

Spill Size. As there is no drilling associated with this DOCD, the WCD entails a complete loss of contents of the largest fuel tank of the DP construction vessel (16,800 bbl of diesel fuel with American Petroleum Institute gravity [API gravity] of 35°).

Spill Probability. Oil Spill Information can be found in Section 9 of the DOCD. bp is expected to comply with NTL 2010-N10 and the applicable 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 hydrocarbon spill in the project area would depend on meteorological and oceanographic conditions at the time. The Oil Spill Risk Analysis (OSRA) model is a computer simulation of oil spill transport that uses realistic data for winds and currents to predict spill trajectory. The OSRA report by Ji et al. (2004) provides conditional contact probabilities for shoreline segments in the Gulf of Mexico. The OSRA model is not intended to project the trajectory of diesel fuel, as diesel is more volatile than crude oil and usually evaporates or disperses within 24 hours of a spill. However, the OSRA results are presented in the EIA to account for a potential "worst-case" in the unlikely event that diesel fuel does contact the shoreline.

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

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

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

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

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

BOEM presented additional OSRA modeling to simulate a spill that continues for 90 consecutive days, with each trajectory tracked for 60 days during four seasons. Similar to the 30-day OSRA, the model is not intended to project the trajectory of diesel fuel, as diesel is more volatile than crude oil and usually evaporates or disperses within 24 hours of a spill. However, the OSRA results are presented in the EIA to account for a potential "worst-case" for the unlikely event that diesel fuel does contact the shoreline.

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

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

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

Table 5. (Continued).

Season	Spring				Summer				Fall				Winter			
Day	3	10	30	60	3	10	30	60	3	10	30	60	3	10	30	60
County or Parish	Conditional Probability of Contact[1] (%)															
State Coastline	Conditional Probability of Contact[1] (%)															
Texas	--	--	--	--	--	--	--	1	--	--	1	2	--	--	--	2
Louisiana	--	6	8	9	3	17	30	35	3	25	36	36	2	18	29	33
Mississippi	9	20	22	22	5	12	15	15	8	15	18	19	8	15	18	20
Alabama	21	33	37	37	6	17	20	20	9	14	15	15	12	18	20	20
Florida	1	11	19	26	1	7	14	16	--	1	3	3	--	2	4	5

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

From Launch Point 2, potential shorelines with a 1% or greater conditional probability of contact within 60 days range from Matagorda County, Texas (winter season), to Levy County, Florida (spring season). Based on statewide contact probabilities within 60 days, Louisiana has the highest likelihood of contact during summer, fall and winter (ranging from 33% to 36% conditional probability), while Alabama has the highest probability of contact in spring (37% conditional probability). The model predicts potential contact with Mississippi shorelines in any season ranging from a 15% conditional probability in summer to a 22% conditional probability in spring (within 60 days of a spill). Texas shorelines are predicted to be potentially contacted only during summer, fall, or winter, with conditional probabilities of contact 2% or less within 60 days. Florida shorelines are predicted to be potentially contacted during any season, with a probability up to 26% in spring. Based on the 60-day trajectories, counties or parishes with 10% or greater contact probability during any season include Plaquemines and St. Bernard Parishes in Louisiana; Jackson County in Mississippi; Mobile and Baldwin counties in Alabama; and Escambia County, Florida (**Table 5**).

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

Weathering. The constituents of diesel fuel are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. NOAA has reported that diesel fuel is readily and completely degraded by naturally occurring microbes (NOAA, 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. Photo-oxidation attacks mainly the medium and high molecular weight PAHs in the oil on the water surface.

Spill Response. All proposed activities and facilities in this DOCD will be covered by the Gulf of Mexico Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated 14 February 2019 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on 15 March 2019. Modifications were made to the approved OSRP under cover letter dated 20 June 2019 and confirmed in compliance by BSEE on 24 July 2019.

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

- 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; and
- A shoreline protection strategy that is consistent with applicable area contingency plans.

bp is a member of the Marine Spill Response Corporation, Clean Gulf Associates, and a client of the National Response Corporation. bp would utilize oil spill response organization personnel and equipment in the event of an oil spill in the Gulf of Mexico. Primary response equipment for the activation of bp's OSRP is located in 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 OSRP and site-specific response for a spill associated with this project.

B. Affected Environment

The project area is in the central Gulf of Mexico, approximately 64 statute miles (103 km) from the nearest shoreline (Plaquemines Parish, Louisiana), 125 statute miles (201 km) from the onshore support base at Port Fourchon, Louisiana, and 168 statute miles (270 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depths at the location of the proposed activities is approximately 1,962 m (6,436 ft) (**Figure 2**) (bp, 2020).

The seafloor in the vicinity of the proposed activities is hummocky due to a sediment drape covering a shallow-buried mass transport deposit. The seafloor gradient at the proposed activities is approximately 0.4°. Based on an assessment of autonomous underwater vehicle survey datasets, no geophysical evidence, hard bottoms or active hydrocarbon seeps were identified that could indicate the presence of high density chemosynthetic communities within 610 m (2,000 ft) of the proposed activities (bp, 2020).

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; 2014; 2015; 2016b; 2017a). These regional descriptions remain valid and are incorporated by reference. General background information is presented in the following sections, and brief descriptions of each potentially affected resource, including site-specific and new information if available, are presented in **Section C**.

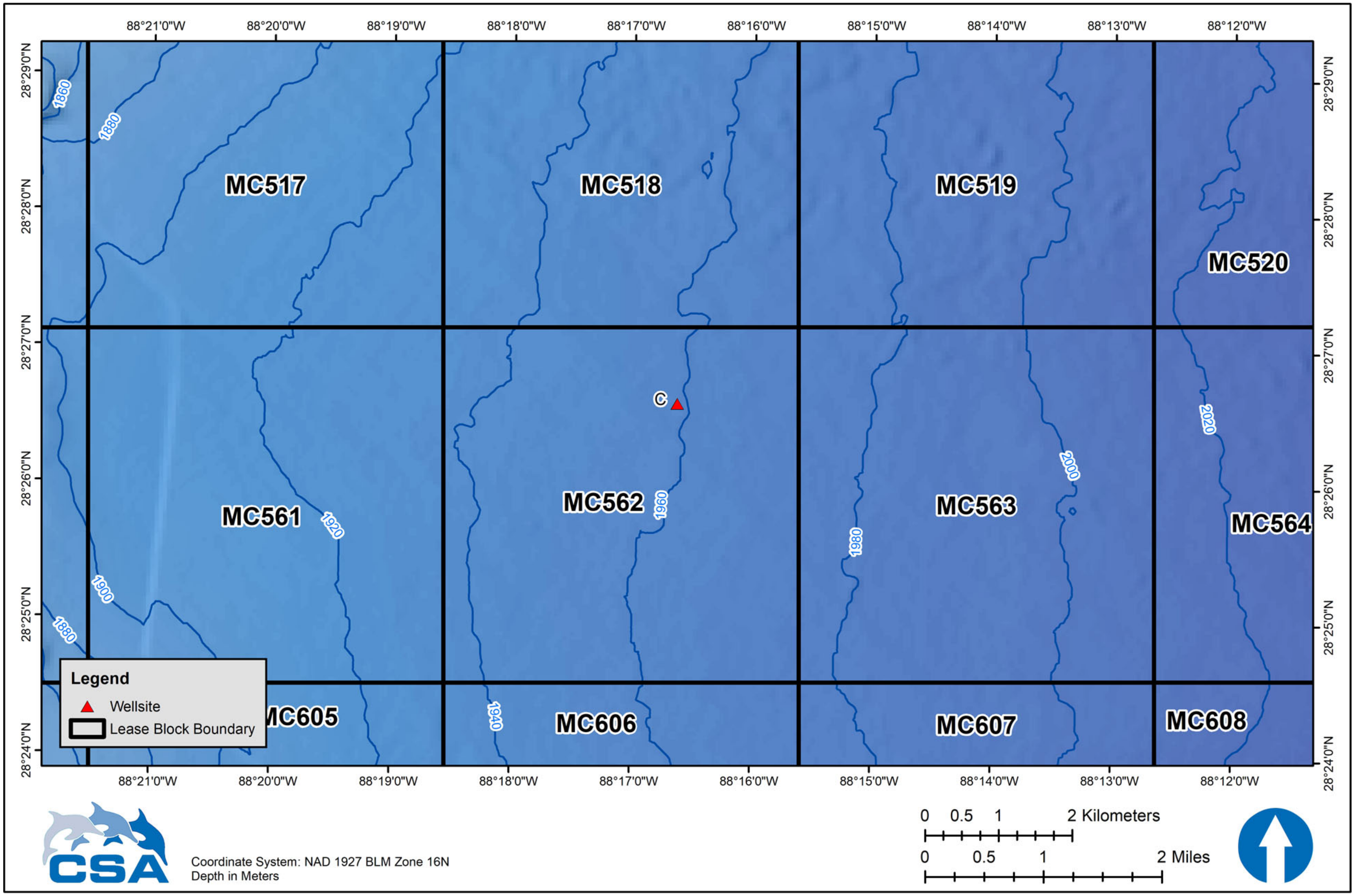


Figure 2. Bathymetric map of the project area showing the location of the Isabela-3 wellsite in Mississippi Canyon Block 562 where installation activities will occur.

C. Impact Analysis

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

C.1 Physical/Chemical Environment

C.1.1 Air Quality

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

In general, ambient air quality of coastal counties along the Gulf of Mexico is relatively good (BOEM, 2012a). As of September 2020, Mississippi, Alabama, and Florida Panhandle coastal counties are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2020). 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). One coastal metropolitan area in Florida (Tampa) was reclassified in 2018 from a nonattainment area to maintenance status for lead based on the 2008 Standard (USEPA, 2020).

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, 2017a). The Gulf of Mexico is located to the southwest of this center of circulation, 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 the proposed 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 hydrocarbon 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 from the proposed activities will be primarily from the construction vessel 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 $PM_{2.5}$,

PM_{10}, 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 similar to bp's proposed activities is not significant and is not expected to cause or contribute to a violation of NAAQS. Given the levels of expected emissions and the distance of the project from shore, emissions from the activities described in bp's proposed DOCD are not likely to contribute to violations of any NAAQS onshore.

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

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

The Breton Wilderness Area, which is part of the Breton National Wildlife Refuge (NWR), is designated under the Clean Air Act as a Prevention of Significant Deterioration (PSD) Class I air quality area. BOEM is required to notify the National Park Service and U.S. Fish and Wildlife Service (USFWS) if emissions from proposed projects may affect the Breton Class I area. Additional review and mitigation measures may be required for sources within 186 miles (300 km) of the Breton Class I area that exceed emission limits agreed upon by the administering agencies (National Park Service, 2010). The project area is approximately 87 statute miles[1] (140 km) from the Breton Wilderness Area. bp and its contractors intend to comply with all BOEM and USFWS requirements regarding air emissions.

There are three Class I air quality areas on the west coast of Florida: St Mark's Wildlife Refuge in Wakulla County, Chassahowitzka Wilderness Area in Hernando County, and Everglades National Park in Monroe, Miami-Dade, and Collier counties. The project area is approximately 264 miles (425 km) from the closest Florida Class I air quality area (Saint Mark's Wildlife Refuge Class I Air

[1] Distance calculated based on the nearest point of block MC 562.

Quality Area). bp expects to comply with emissions requirements as directed by BOEM. No further analysis or control measures are required.

Impacts of a Small Fuel Spill

Potential impacts of a small spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a; 2015; 2016b; 2017a). The probability of a small spill would be minimized by preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of the contractor's as well as bp's OSRP is expected to reduce the potential impacts. DOCD Appendix G includes a detailed discussion of the spill response measures that would be employed.

In the EIA, the small spill scenario is proposed to occur in offshore waters at or near the construction vessel. A small fuel spill would affect air quality near the spill site by introducing VOCs into the atmosphere through evaporation. The ADIOS2 model (see **Section A.9.1**) indicates that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2016a). 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 dissipate prior to making landfall or reaching coastal waters (see **Section A.9.1**).

Impacts of a Large Hydrocarbon Spill

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

A large hydrocarbon spill could potentially affect air quality by introducing VOCs into the atmosphere through evaporation from the slick. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of VOCs released.

Because of the project area's location (64 statute miles [103 km]) from the nearest shoreline, most air quality impacts would occur in offshore waters with minimal chance to affect onshore air quality. However, depending on the spill trajectory and the effectiveness of spill response measures, coastal air quality could be affected if hydrocarbons 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, 2017a). Kennicutt (2000) noted that the deepwater region has little evidence of contaminants in the dissolved or particulate phases of the water column. Within the northern Gulf of Mexico, there are localized areas (termed natural seeps) that release natural seepage of oil, gas, and brines from sub-surface deposits into near surface sediments and up through the water column. No natural seeps were noted within 610 m (2,000 ft) of the proposed activities (bp, 2020).

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 hydrocarbon spill) as discussed below.

Impacts of Effluent Discharges

Treated sanitary and domestic wastes, including those from support vessels, may have a transient effect on water quality in the immediate vicinity of the discharge 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. Applicable NPDES/VGP 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 construction vessel will flow overboard without treatment. However, rainwater that falls on potentially contaminated 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/VGP 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/VGP permit, such as desalination unit brine; uncontaminated cooling water, firewater, ballast water, bilge water, commissioning discharges and other discharges of seawater and freshwater to which treatment chemicals have been added are expected to dilute rapidly and have little or no impact on water quality.

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

Impacts of a Small Fuel Spill

Potential impacts of a small spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a; 2015; 2016b; 2017a). In the EIA, the small spill scenario is proposed to occur in offshore waters at or near the construction 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 and it's contractors' OSRP are 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 oil constituents is light to intermediate and can be readily degraded by abiological weathering processes (e.g., evaporation, dissolution, dispersion, and photochemical oxidation) and biological processes (microbial degradation). Diesel oil is much lighter than water (specific gravity is between 0.83 and 0.88, compared to 1.03 for seawater). When spilled on water, diesel oil spreads very quickly to a thin film of rainbow and silver sheens, except for marine diesel, which may form a thicker film of dull or dark colors. However, because diesel oil has a very low viscosity, it is readily dispersed into the water column when winds reach 5 to 7 knots or with breaking waves (NOAA, 2017). It is possible for the diesel oil that is dispersed by wave action to form droplets that are small enough be kept in suspension and moved by the currents.

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

The extent and persistence of water quality impacts from a small diesel fuel spill would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. It is estimated that more than 90% of a small diesel spill would evaporate or disperse within 24 hours (NOAA, 2016a) (see **Section A.9.1**). The sea surface area covered with a very thin layer of diesel fuel would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. In addition to removal by evaporation, constituents of diesel oil are readily and completely degraded by naturally occurring microbes (NOAA, 2006; 2017). 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 Hydrocarbon Spill

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

Most of the spilled fuel would be expected to form a slick at the surface. Dispersants are not expected to be applied due to the rapid evaporation and dispersion of diesel fuel in seawater.

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 VOCs released. Weathering processes that affect spilled hydrocarbons on the sea include adsorption (sedimentation), biodegradation, dispersion, dissolution, emulsification, evaporation, and photo oxidation.

Due to the project area being located approximately 64 statute miles (103 km) from the nearest shoreline (Plaquemines Parish, Louisiana), it is expected that most water quality impacts would occur in offshore waters before low molecular weight alkanes and volatiles are weathered (Operational Science Advisory Team, 2011), especially in the event of a spill lasting less than 30 days. The 30-day OSRA modeling (**Table 4**) indicates nearshore waters and embayments of Plaquemines Parish, Louisiana, is the coastal area with the most potential for water quality to be affected (5% probability within 10 days and 11% probability within 30 days). Other Louisiana shorelines may be affected within 10 days (Lafourche Parish), and shorelines in Louisiana and Florida could be affected within 30 days. The 60-day OSRA model predicts potential contact of shorelines between Matagorda County, Texas, and Levy County, Florida, with a maximum conditional probability of contact of 24% in Plaquemines Parish, Louisiana (**Table 5**) (BOEM, 2017b).

C.2 Seafloor Habitats and Biota

The water depth at the location of the proposed activities is approximately 1,962 m (6,436 ft) (bp, 2020). According to BOEM (2016a), existing information for the deepwater Gulf of Mexico indicates that the seafloor is composed primarily of soft sediments; exposed hard substrate habitats and associated biological communities are rare. The site clearance letters did not note the presence of hard bottom communities or potential seepage locations within 610 m (2,000 ft) of the location of the proposed activities (bp, 2020). 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 6** summarizes data collected at two stations in water depths similar to those in the proposed installation area.

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

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

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

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

The benthic macroinfauna is characterized by small mean individual sizes and low densities, both of which reflect the meager primary production in surface waters of the Gulf of Mexico continental slope (Wei, 2006). Densities decrease exponentially with water depth. Based on an equation presented by Wei (2006), macroinfaunal density in the water depth of the project area are expected to be approximately 1,589 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 2E, which extends from the Texas-Louisiana slope to the west Florida terrace. The most abundant species in this zone were the polychaetes *Aricidea suecica*, *Litocorsa antennata*, *Paralacydonia paradoxa*, and *Tharyx marioni*; and the bivalve *Heterodonta* spp. (Wei, 2006).

The megafaunal density at a station in the vicinity of the project area was 1,451 individuals ha^{-1}. Common megafauna included motile taxa such as decapod crustaceans, holothurian echinoderms, and demersal fishes as well as sessile taxas such as sponges and octocorals (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).

The only IPF that could potentially affect benthic communities is physical disturbance of the seafloor. A small fuel spill or a large hydrocarbon 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

The areal extent of impacts to the seafloor from the installation of seafloor infrastructure will be small and limited to the footprint of the SMS and electrical flying leads. Soft bottom benthic communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway, 1988, Gallaway et al., 2003, Rowe and Kennicutt, 2009). Impacts from the physical disturbance of the seafloor during this project are expected be localized and will not likely have a significant impact on soft bottom benthic communities in the region.

C.2.2 High-Density Deepwater Benthic Communities

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

The site clearance letters did not identify any features that could support high-density deepwater benthic communities within 610 m (2,000 ft) of the proposed activities (bp, 2020).There are no IPFs for this project that could affect high-density deepwater benthic communities. Physical disturbance and effluent discharge are not considered IPFs for deepwater benthic communities because these communities are not expected to be present down current of the location of the proposed activities. Small or large diesel fuel spills would not affect benthic communities because the diesel fuel would float and dissipate on the sea surface.

C.2.3 Designated Topographic Features

The lease block is not within or near a designated topographic feature or a no-activity zone as identified in NTL 2009-G39. The nearest designated Topographic Feature Stipulation Block is located approximately 73 statute miles (117 km) 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 a large diesel fuel spill from the DP construction vessel fuel tank, a surface slick would not contact these seafloor features.

C.2.4 Pinnacle Trend Area Live Bottoms

The project area is not covered by the Live Bottom (Pinnacle Trend) Stipulation. As defined by NTL 2009-G39, the nearest Pinnacle Stipulation Block is located approximately 51 statute miles (82 km) 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 a large diesel fuel spill from the DP construction vessel fuel tank, a surface slick would not contact these seafloor features.

C.2.5 Eastern Gulf Live Bottoms

The project area is not covered by the Live Bottom (Low-Relief) Stipulation, which applies to seagrass communities and low-relief hard bottom reef within the Eastern Gulf of Mexico Planning Area leases in water depths of 100 m (328 ft) or less and portions of Pensacola and Destin Dome Area blocks in the Central Gulf of Mexico Planning Area. The nearest block covered by the Live Bottom Stipulation, as defined by NTL 2009-G39, is located approximately 70 statute miles (113 km) 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 a large diesel fuel spill from the DP construction vessel fuel tank, a surface slick would not contact these seafloor features.

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

Table 7. 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 (2020a) and NOAA Fisheries (2020).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Bryde's whale	*Balaenoptera edeni*	E	X	--	None
Sperm whale	*Physeter macrocephalus*	E	X	--	None
West Indian manatee	*Trichechus manatus*[1]	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T,E[2]	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)
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	None
Rough cactus coral	*Mycetophyllia ferox*	T	--	X	None
Lobed star coral	*Orbicella annularis*	T	--	X	None
Mountainous star coral	*Orbicella faveolata*	T	--	X	None
Boulder star coral	*Orbicella franksi*	T	--	X	None
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus* 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] 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.

[2] 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 northern Gulf Coast include the West Indian manatee, Piping Plover, Whooping Crane, Gulf sturgeon, and four subspecies of *Peromyscus* beach mouse. Critical habitat has been designated for all of these species as indicated in **Table 7** and discussed in individual sections.

The sperm whale (*Physeter macrocephalus*), five species of sea turtles, and the oceanic whitetip shark are the only Endangered or Threatened species likely to occur in or near the project area. The listed sea turtles include the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, loggerhead turtle, and green turtle (Pritchard, 1997). Effective 11 August 2014, NMFS has designated certain marine areas as critical habitat for the Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle (see **Section C.3.5**). 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, fin whale, North Atlantic right whale, and sei whale) have been reported in the Gulf of Mexico, but are considered rare or extralimital (Würsig, 2017). These species are not included in the most recent NMFS stock assessment report (Hayes et al., 2020) nor in the most recent BOEM multisale EIS (BOEM, 2017a); therefore, they are not considered further in the EIA.

The Bryde's whale (*Balaenoptera edeni*) exists in the Gulf of Mexico as a small, resident population. It is the only baleen whale known to be resident to the Gulf and is federally listed as Endangered under the ESA. The genetically distinct Northern Gulf of Mexico stock is severely restricted in range, being found almost exclusively in its core distribution area within the northeastern Gulf in the waters of the DeSoto Canyon (Waring et al., 2016) and are therefore expected to be uncommon within the project area. The Threatened giant manta ray (*Mobula birostris*) is known from the Gulf of Mexico and 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.

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.3.15**).

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

C.3.1 Sperm Whale (Endangered)

The Endangered marine mammal 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, 2010). 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-m (656 and 3,280 ft) depth contours (Jochens et al., 2008). Male sperm whales were more variable in their movements and were documented in water depths greater than 3,000 m (9,843 ft). Generally, groups of sperm whales 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 construction 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 hydrocarbon 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.

Though 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 regional oil and gas activities. Therefore, marine debris is likely to have negligible impacts on sperm whales and is not discussed further (See **Table 2**).

Impacts of Construction Vessel Presence, Marine Sound, and Lights

Sound from routine infrastructure 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 (2016) lists sperm whales in the same functional hearing group (i.e., mid frequency cetaceans) as most dolphins and other toothed whales, with an estimated hearing sensitivity from 150 Hz to 160 kHz. Therefore, DP vessel-related sound is likely to be heard by sperm whales. 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 30 Hz and 5 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 localized nature of the proposed installation operations, sperm whales would move away from the proposed operations area, and sound levels that could cause auditory injury would be avoided. Sound associated with proposed vessel operations may cause behavioral disturbances to sperm whales. Observations of behavioral responses of marine mammals to anthropogenic sounds, in general, have been limited to short term behavioral responses, which included the cessation of feeding, resting, or social interactions (NMFS, 2009a). Animals can determine the direction from which a sound arrives based on cues, such as differences in arrival times, sound levels, and phases at the two ears. Thus, an animal's directional hearing capabilities have a bearing on its ability to avoid sound sources.

NMFS (2018a) presents criteria that are used to determine physiological (i.e., injury) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2018a) and therefore, revert to thresholds established and published by NMFS in 70 *Federal Register* (*FR*) 1871. Behavioral disturbance thresholds for marine mammals and are applied equally across all functional hearing groups. Received SPL_{rms} of 120 dB re 1 µPa from a non-impulsive source are considered high enough to elicit a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. 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).

For mid frequency cetaceans exposed to a non-impulsive source (such as installation operations), permanent threshold shifts are estimated to occur when the mammal has received a sound exposure level (SEL) of 198 dB re 1 μPa^2 s over a 24-hour period (NMFS, 2016).

Similarly, temporary threshold shifts are estimated to occur when the mammal has received an SEL of 178 dB re 1 μPa^2 s over a 24-hour period. Based on transmission loss calculations (see Urick, 1983), typical sources with DP thrusters are not expected to produce received SPL_{rms} greater than 160 dB re 1 μPa beyond 105 ft (32 m) from the source. Due to the short propagation distance of these SPL and the transient nature of sperm whales, it is not expected that any sperm whales will receive exposure levels necessary for the onset of auditory threshold shifts.

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar marine sound sources. Installation-related marine sound associated with this project may contribute to increases in the ambient soundscape 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. Construction vessel lighting and presence are not expected to impact sperm whales (NMFS, 2007; BOEM, 2016a; 2017a). Vessel lighting and presence are not identified as IPFs for sperm whales (NMFS, 2007; BOEM, 2012a; 2013; 2014b; 2015; 2016c; 2017a).

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, 2010). 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. 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).

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 (2020a) 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 noise 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 1.1 (Hayes et al., 2019). 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 (2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011) with discussions germane to the Gulf of Mexico populations concerning composition and fate of petroleum and spill-treating agents in the marine environment, aspects of cetacean ecology, and physiological and toxic effects of oil on cetaceans. For this DOCD, there are no unique site-specific issues with respect to spill impacts on these animals that were not analyzed in the previous documents.

A small fuel spill in offshore waters would produce a thin sheen on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2016a). 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 and it's contractors' OSRP are expected are expected to mitigate and lessen the potential for impacts on sperm whales. Given the open ocean location of the project area, the duration of a small spill and therefore potential for impacts to occur are expected to be brief.

Impacts of a Large Hydrocarbon Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2020a) and BOEM (2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). For this DOCD, there are no unique site-specific issues with respect to spill impacts on sperm whales.

Impacts of 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 depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds (Hayes et al., 2019). Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals, including displacement from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sperm whales and potentially result in vessel 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) replaces compliance with the NTL. Based on the current PBR level for the Gulf of Mexico stock of sperm whales (1.1), 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 Bryde's Whale (Endangered)

The Bryde's whale is the only year-round resident baleen whale in the northern Gulf of Mexico. The Bryde's whale is most frequently sighted in the waters over the DeSoto Canyon between the 100 m (328 ft) and 400 m (3,280 ft) isobaths (Rosel et al., 2016; Hayes et al., 2019). Although their distribution is primarily restricted to the DeSoto Canyon, available data suggests it is possible that Bryde's whales could occur in the project area, although their presence would be uncommon.

Bryde's whales found in the Gulf of Mexico are distinct from Bryde's whales worldwide and are considered a separate (unnamed) subspecies. The Gulf of Mexico Bryde's whale subspecies was classified by NOAA as an Endangered species under the ESA on 15 May 2019.

IPFs that could affect the Bryde's whales include construction vessel presence, marine sound, and lights; support vessel and helicopter traffic; and both types of spill accidents: a small fuel spill and a large hydrocarbon spill. It is unlikely that the Bryde's whales will occur in the project area. Effluent discharges are likely to have negligible impacts on Bryde'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 Bryde's whales in the Gulf of Mexico.

Though NMFS (2020a) identified 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 Bryde's whales. NMFS (2020a) estimated one sublethal take and no lethal takes of Bryde's whales from marine debris over 50 years of proposed regional oil and gas activities. Therefore, marine debris is likely to have negligible impacts on Bryde's whales and is not further discussed (See **Table 2**).

Impacts of Construction Vessel Presence, Marine Sound, and Lights

Sound produced by the construction vessel may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. Sound associated with installation activities is relatively low in intensity relative to impulsive sources such as airgun sounds, and an individual animal's sound exposure would be transient. Sound produced by the construction vessel may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. However, it is worth noting most source level estimates for offshore vessels assume a single point source, when in reality multiple DP thrusters are dispersed around the vessel which contribute to received sound levels near the vessel. This results in source levels close to the vessel being overestimated.

NMFS (2018a) lists Bryde's whales in the functional hearing group of low frequency cetaceans (baleen whales), with an estimated hearing sensitivity from 7 Hz to 35 kHz. Therefore, vessel-related sound is likely to be heard by Bryde's whales. Frequencies <1,000 Hz produced by the installation operations are more likely to be perceived by low-frequency cetaceans.

It is expected that, due to the relatively stationary and localized nature of the installation operations, Bryde'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 using DP thrusters may cause behavioral disturbances to individual Bryde's whales. 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 70 *FR* 1871. Received SPL_{rms} of 120 dB re 1 µPa from a non-impulsive source are considered high enough to elicit a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, exposure to a SPL_{rms} of 120 dB re 1 µPa does not equate to a behavioral response or a biological consequence; rather it represents the level at which onset of a behavioral response may occur. In actuality, behavioral effects are highly contextual, dependent on the environmental in which the source is producing sound, life stage of the animal, and the animal's past experience with similar types of sound (Southall et al., 2007; Ellison et al., 2012).

For low frequency cetaceans, specifically the Bryde's whale, permanent and temporary threshold shift onset is estimated to occur at SEL_{cum} of 199 dB re 1 μPa^2 s and 179 re 1 μPa^2 s, repectively. While above-threshold levels may occur up to 100s of meters away from the source, the stationary nature of installation activities and animal movement or avoidance behavior from Bryde's whales make it unlikely that any Bryde's whale will remain in proximity to installation activities for a full 24-hour period to receive SEL_{cum} necessary for the onset of auditory threshold shifts.

The construction vessel will be located within a deepwater, open ocean environment. Sounds generated by installation operations will be generally non-impulsive, with some variability in sound level and frequency. This analysis assumes that the continuous nature of sounds produced by the construction vessel will provide individual whales with cues relative to the direction and relative distance (sound intensity) of the sound source, and the fixed position of the vessel will allow for active avoidance of potential physical impacts. Installation-related sound associated with this project may contribute to increases the ambient sound in the region, but it is not expected to be at amplitudes sufficient enough to cause hearing effects to Bryde's whales. Furthermore, it is very unlikely that Bryde's whales occur within the project area and occur only in low densities in the Gulf of Mexico; therefore, no significant impacts are expected. Vessel lighting and presence are not expected to impact Bryde's whales (BOEM, 2017a).

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb Bryde's whales and creates of the potential for vessel collisions. 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) replaces compliance with the NTL. When whales are sighted, vessel operators and crews are required to maintain a distance of 1,640 ft (500 m) or greater whenever possible (NTL BOEM-2016-G01; NMFS, 2020a). 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 Bryde'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 [2020a] Appendix C). However, this mitigation is effective only during daylight hours and during periods of adequate visibility.

Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing Bryde's whales. The current PBR level for the Gulf of Mexico stock of Bryde's whale is 0.03 (Hayes et al., 2019). Mortality of a single Bryde's whale would constitute a significant impact to the local (Gulf of Mexico) stock of Bryde's whales.

However, it is very unlikely that Bryde’s whale occur 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 Bryde’s whales. Based on studies of cetacean responses to sound, the observed responses to brief overflights by aircraft were short-term and limited to behavioral disturbances (Smultea et al., 2008). Helicopters maintain altitudes above 213 m (700 ft) during transit to and from the offshore working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animal(s). In addition, guidelines and regulations issued by NMFS under the authority of the MMPA specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2016a; 2017a; NMFS, 2020a). Due to the brief potential for disturbance the low density of Bryde’s whales thought to reside 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; 2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). In the unlikely event of a spill, implementation of bp’s and it’s contractors’ OSRP are expected to mitigate and reduce the potential for impacts on Bryde’s whales. Given the open ocean location of the project area and the duration of a small spill, any impacts are expected to be brief.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill as well as the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that more than 90% would evaporate or disperse naturally within 24 hours (NOAA, 2016a). The area of diesel fuel on the sea surface would range from 1.2 to 12 ac (0.5 to 5 ha), depending on sea state and weather conditions.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and 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 Bryde’s whales and the unlikelihood of occurrence in the project area, no significant impacts are expected.

Impacts of a Large Hydrocarbon Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a; 2015; 2016b; 2017a), and NMFS (2020a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011).

Potential impacts of a large hydrocarbon spill on Bryde’s whales could include direct impacts from 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 Bryde's 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 and NMFS (2020a) (see **Table 1**) to reduce the potential for colliding with or disturbing these animals. In the event of hydrocarbons from a large spill contacting Bryde's whales, it is expected that impacts resulting in the injury or death of individual Bryde's whales would be significant based on the current PBR level for the Gulf of Mexico subspecies and stock (0.03). Mortality of a single Bryde's whale would constitute a significant impact to the local (Gulf of Mexico) stock of Bryde's whales. The core distribution area for Bryde's whales is within the eastern Gulf of Mexico OCS Planning Area; therefore, it is very unlikely that Bryde's whales occur within the project area and surrounding waters.

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 (U.S. Fish and Wildlife Service, 2001a). A species description is presented in the West Indian manatee recovery plan (U.S. Fish and Wildlife Service, 2001a). Critical habitat has been designated in southwest Florida.

Manatee sightings in Louisiana have increased as the species extends its presence farther west of Florida in the warmer months (Wilson et al., 2003). Manatees are typically found in coastal and riverine habitats, but have rarely been seen in deepwater areas, usually in colder months when they seek refuge from colder coastal waters (U.S. Fish and Wildlife Service, 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 potentially may affect manatees include support vessel and helicopter traffic and a large hydrocarbon spill. A small fuel spill in the project area would be unlikely to affect manatees, as the project area is approximately 64 statute miles (103 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. Compliance with BSEE-NTL 2015-G03 is intended to minimize the potential for marine debris-related impacts on manatees.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb manatees, and there is also a risk of vessel collisions, which are identified as a threat in the recovery plan for this species (U.S. Fish and Wildlife Service, 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. 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. Vessel collision avoidance measures described in NMFS (2020a) 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 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 also has the potential to disturb manatees. Rathbun (1988) reported that manatees were disturbed more by helicopters than by fixed-wing aircraft; however, the helicopter was flown at relatively low altitudes of 20 to 160 m (66 to 525 ft). Helicopters used in support operations maintain a minimum altitude of 213 m (700 ft) while in transit offshore, 305 m (1,000 ft) over unpopulated areas or across coastlines, and 610 m (2,000 ft) over populated areas and sensitive habitats such as wildlife refuges and park properties. In addition, guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2017a; NMFS, 2020a). This mitigation measure will minimize the potential for disturbing manatees. No significant impacts are expected.

Impacts of a Large Hydrocarbon Spill

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

In the event that manatees were exposed to hydrocarbons, effects could include direct impacts from 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, 2017a). 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 prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event that a large spill reached coastal waters where manatees were present, the level of vessel and aircraft activity associated with spill response could disturb manatees and potentially result in vessel collisions, entanglement, or other injury or stress. Response vessels would be expected to operate in accordance with NTL BOEM-2016-G01 and NMFS (2020a) (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 GOM; therefore, in the event of mortality of individual manatees from a large hydrocarbon 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 cited 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, four species of beaked whales, and 14 species of delphinid whales (dolphins). All marine mammals are protected species under the MMPA. The most common non-endangered cetaceans in the deepwater environment are small odontocetes such as the pantropical spotted dolphin, spinner dolphin, and bottlenose dolphin. A brief summary is presented below, and additional information on these groups is presented by BOEM (2017a).

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

Beaked whales. Four species of beaked whales are known to occur in the Gulf of Mexico: Blainville's beaked whale (*Mesoplodon densirostris*), Sowerby's beaked whale (*Mesoplodon bidens*), Gervais' beaked whale (*Mesoplodon europaeus*), and Cuvier's beaked whale (*Ziphius cavirostris*). Stranding records 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 Gulf of Mexico side of Florida (Taylor et al., 2008). Blainville's beaked whales are rare, with only four documented strandings in the northern Gulf of Mexico (Würsig et al., 2000; Würsig, 2017).

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 (Waring et al., 2016).

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

The bottlenose dolphin (*Tursiops truncatus*) 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 31 geographically distinct population units, or stocks, for management purposes by NMFS (Hayes et al., 2019).

IPFs that potentially may affect non-endangered marine mammals include construction vessel presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents – a small fuel spill and a large hydrocarbon 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 Construction Vessel Presence, Marine Sound, and Lights

The presence of the construction 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. Vessel presence and lighting are not considered as IPFs for marine mammals (BOEM, 2017a).

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

Sound from routine 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 sounds 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 installation sound will affect each group differently depending on the frequency bandwidths produced by operations. Generally, sounds produced by vessels on DP are dominated by frequencies below 10 kHz. Thus, vessel DP sound sources are out of range for the high frequency group.

For mid frequency cetaceans exposed to a non-impulsive source (like installation operations), permanent threshold shifts are estimated to occur when the mammal has received an SEL of 198 dB re 1 μPa^2 s over a 24-hour period. Simlarly, temporary threshold shifts are estimated to occur when the mammal has received an SEL of 178 dB re 1 μPa^2 s over a 24-hour period. Based on transmission loss calculations (Urick, 1983), open water propagation of noise produced by typical sources with intermittent use of DP thrusters during offshore operations, are not expected to produce received SPL_{rms} greater than 160 dB re 1 µPa beyond 105 ft (32 m) from the source. Due to the short propagation distance of these SPL_{rms}, the transient nature of marine mammals and the stationary nature of the proposed activites, it is not expected that any marine mammals will receive exposure levels necessary for the onset of auditory threshold shifts.

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 70 *FR* 1871. Received SPL_{rms} of 120 dB re 1 µPa from a non-impulsive source are considered high enough to elicit a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. 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. Support vessel lighting and presence are not expected to impact marine mammals by BOEM (2017a).

Vessel lighting and presence are not identified as IPFs for marine mammals by BOEM (2017a).

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 kn 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. However, this mitigation is effective only during daylight hours and during periods of adequate visibility.

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.

Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing cetaceans. 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 = 2.5, Clymene dolphin = 0.6, killer whale = 0.1, pygmy killer whale = 0.8, dwarf, and pygmy sperm whales = 0.9) (Hayes et al. 2019). Mortality of individuals equal to or in excess of their PBR level would constitute a significant impact to the local (Gulf of Mexico) stocks of these species.

Helicopter traffic also has the potential to disturb marine mammals (Würsig et al., 1998). However, while flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. In addition, guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2012a; 2016a). Maintaining this altitude will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2017a; NMFS, 2020a).

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a; 2015; 2016b). 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 preventative measures during fuel transfer. In the unlikely event of a spill, implementation of the contractor's and bp's OSRP 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 Hydrocarbon Spill

Potential spill impacts on marine mammals are discussed by BOEM (2017a). For this DOCD, there are no unique site-specific issues. Impacts of hydrocarbon spills on marine mammals can include direct impacts from 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 hydrocarbons 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, etc.) (BOEM, 2017a). The increased level of vessel and aircraft activity associated with spill response could disturb marine mammals, potentially resulting in behavioral changes. The large number of response vessels could result in vessel 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) replaces compliance with the NTL. 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 = 2.5, Clymene dolphin = 0.6, killer whale = 0.1, pygmy killer whale = 0.8, dwarf and pygmy sperm whales = 0.9) (Hayes et al., 2019), mortality of individuals equal to or in excess of their PBR level would constitute a significant impact 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 (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) turtles. As of 6 May 2016, the entire North Atlantic DPS of the green turtle (*Chelonia mydas*) is listed as Threatened (81 *FR* 20057). The DPS of loggerhead turtles (*Caretta caretta*) that occurs in the Gulf of Mexico is listed as Threatened, although other DPSs are Endangered.

Critical habitat has been designated for the loggerhead turtle in the Gulf of Mexico as shown in **Figure 3**. Loggerhead turtles in the Gulf of Mexico are part of the Northwest Atlantic Ocean DPS (76 FR 58868). In July 2014, NMFS and the USFWS designated critical habitat for this DPS (NMFS, 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 pelagic existence after being removed from reefs during rough weather. Rafts of *Sargassum* spp. serve as important foraging and developmental habitat for numerous fishes, and young sea turtles, including loggerhead turtles. NMFS designated three other categories of critical habitat; of these, two (migratory habitat and overwintering habitat) are along the Atlantic coast and the third (breeding habitat) is found in the Florida Keys and along the Florida east coast (NMFS, 2014a).

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

Leatherbacks are the species most likely to be present near the project area, as they 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 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 may be present in deepwater areas, including the project area, where they may be associated with *Sargassum* spp. and other flotsam. All five sea turtle species in the Gulf of Mexico are migratory and use different marine habitats according to their life stage. These habitats include high-energy beaches for nesting females and emerging hatchlings and pelagic convergence zones for hatchling and juvenile turtles. As adults, green, hawksbill, and loggerhead turtles forage primarily in shallow, benthic habitats. Leatherback turtles are the most pelagic of the sea turtles, feeding primarily on jellyfish.

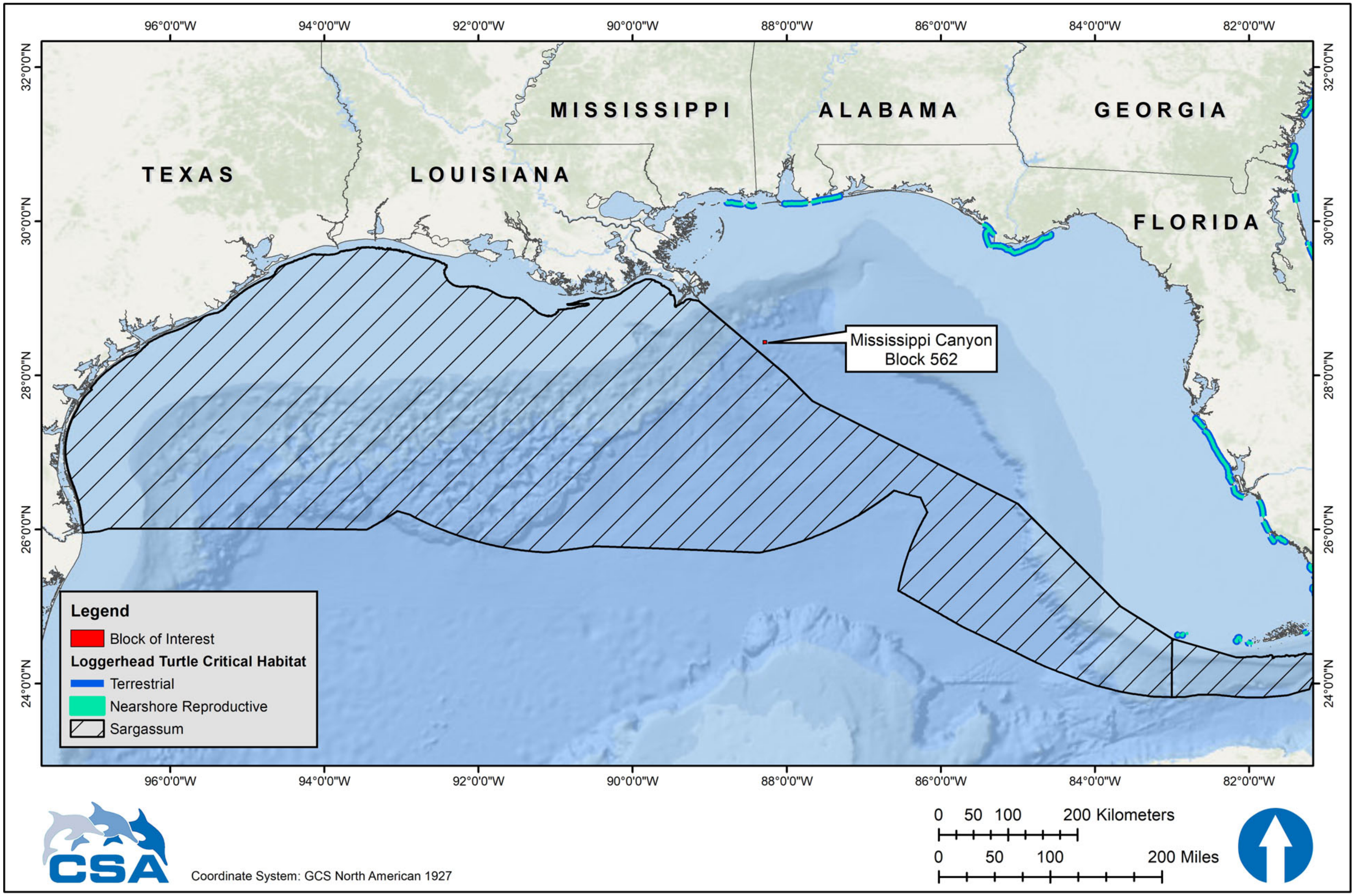


Figure 3. Location of loggerhead turtle designated critical habitat in relation to the project area.

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 and leatherback turtles – Green and leatherback turtles infrequently nest on Florida Panhandle beaches (Florida Fish and Wildlife Conservation Commission, nd-b; 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 262 Kemp's ridley turtle nests have been counted on Texas beaches for the 2020 nesting season. A total of 190 Kemp's ridley turtle nests were counted on Texas beaches during the 2019 nesting season and a total of 250 Kemp's ridley turtle nests were counted on Texas beaches during the 2018 nesting season. These are a decrease from the 353 Kemp's ridley turtle nests counted in the 2017 nesting season (Turtle Island Restoration Network, 2020). Padre Island National Seashore along the coast of Willacy, Kenedy, and Kleberg Counties in southern Texas, is the most important nesting location for this species in the United States, although there have been occasional reports of Kemp's ridleys nesting in Alabama (Share the Beach, 2016).
- Hawksbill turtles – Hawksbill turtles typically do not nest anywhere near the project area, with most nesting in the region located in the Caribbean Sea and on the beaches of the Yucatán Peninsula (U.S. Fish and Wildlife Service, 2015).

IPFs that could potentially affect sea turtles include construction vessel presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large hydrocarbon 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.

Though 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 (See **Table 2**).

Impacts of Construction Vessel Presence, Marine Sound, and Lights

Installation activities produce a broad array of sounds at frequencies and intensities that may be detected by sea turtles (Samuel et al., 2005, Popper et al., 2014). Potential impacts may include behavioral disruption and temporary or permanent displacement from the area near the sound source. There is scarce information regarding hearing and acoustic thresholds for marine turtles.

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 are derived from fish hearing data rather than from marine mammal hearing data in combination with the limited experimental data available (Popper et al., 2014). There are no quantitative criteria for injury in sea turtles from non-impulsive sources, rather Popper et al. (2014) provide qualitative levels of potential risk based on how far an animal is from the source (i.e., near, intermediate, far). For behavior, Blackstock et al. (2018) suggested using an SPL_{rms} threshold of 175 dB re 1 µPa based on responses of sea turtles to airgun signals reported by McCauley et al., 2000). No distinction is made between impulsive and non-impulsive sources for these thresholds. 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 installation activities. Any impacts would likely be short-term behavioral changes such as diving and evasive swimming, disruption of activities, or departure from the area. Because of the limited scope and short duration of installation activities, these short-term impacts are not expected to be biologically significant to sea turtle populations.

Artificial lighting can disrupt the nocturnal orientation of sea turtle hatchlings (Tuxbury and Salmon, 2005; Berry et al., 2013; Simões et al., 2017). However, hatchlings may rely less on light cues when they are offshore than when they are emerging on the beach (Salmon and Wyneken, 1990). NMFS (2007) concluded that the effects of lighting from offshore structures on sea turtles are insignificant.

NMFS (2020a) stated sea turtles have the potential to be entangled or entrapped in moon pools, and though many sea turtles could exit the moon pool under their own volition, sublethal effects could occur. If the vessel is equipped with a moon pool, a trained crew member or company representative will monitor the moon pool area for sea turtles during operations. If a sea turtle is detected in the moon pool, it will be immediately reported to agencies including NMFS, BOEM, and BSEE per NMFS (2020a); compliance with ensuing agency guidance is expected. Resuscitation of any trapped sea turtles is expected to occur in compliance with NMFS (2020a) Appendix J.

Based on the moon pool entrapment cases of sea turtles reported and successful rescues and releases that have occurred, NMFS (2020a) estimated approximately about one sea turtle will be sub lethally entrapped in moon pools every year. Therefore, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb sea turtles, and there is also a risk of vessel collisions. Data show that vessel traffic is one cause of sea turtle mortality in the Gulf of Mexico (Lutcavage et al., 1997). While adult sea turtles are visible at the surface during the day and in clear weather, they can be difficult to spot from a moving vessel when resting below the water surface, during nighttime, or during periods of inclement weather. To reduce the potential for vessel collisions, BOEM issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for sea turtles and slow down or stop their vessel to avoid 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) 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 164 ft (50 m) or greater whenever possible (NMFS [2020a] Appendix C). 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 also has the potential to disturb sea turtles. However, while flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. This altitude 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 (2017a). For this DOCD, there are no unique site-specific issues with respect to spill impacts on sea turtles.

The probability of a fuel spill is expected to be minimized by preventative measures during fuel transfer. In the unlikely event of a spill, implementation of bp's and it's contractors' OSRP are 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 and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and 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, 2016a). 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 120 statute miles (193 km) from the project area. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to natural dispersion.

Loggerhead Critical Habitat – *Sargassum*. The project area is approximately 7 statute miles (11 km) from the designated *Sargassum* critical habitat for the loggerhead turtles (**Figure 3**). Due to the distance from the project area, a small diesel fuel spill is unlikely to affect *Sargassum* and juvenile turtles in this habitat. However, if juvenile sea turtles come into contact with or ingest diesel oil, impacts could include death, injury, or other sublethal effects. Effects of a small spill on *Sargassum* critical habitat for loggerhead turtles would be limited to the small area (0.5 to

5 ha [1.2 to 12 ac]) likely to be impacted by a small spill. An impact area of 5 ha (12 ac) would represent a negligible portion of the approximately 40,662,810 ha (100,480,000 ac) designated *Sargassum* critical habitat for loggerhead turtles in the northern Gulf of Mexico. However, if juvenile sea turtles are present in the area impacted, significant impacts to the regional population could occur.

Impacts of a Large Hydrocarbon Spill

Impacts of diesel 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; ingestion of hydrocarbons 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 and it's contractors' OSRP are 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 hydrocarbons reach sea turtle nesting beaches, nesting sea turtles and egg development could be affected (NMFS, 2007). An oiled beach could affect nest site selection or result in no nesting at all (e.g., false crawls). Upon hatching and successfully reaching the water, hatchlings are subject to the same types of spill exposure hazards as adults. Hatchlings that contact hydrocarbon residues while crossing a beach can exhibit a range of effects, from acute toxicity to impaired movement and normal bodily functions (NMFS, 2007).

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

Loggerhead Critical Habitat – *Sargassum*. The project area is approximately 7 statute miles (11 km) from the loggerhead turtle critical habitat designated as *Sargassum* habitat, which includes most of the Western and Central Planning Areas in the Gulf of Mexico and parts of the southern portion of the Eastern Planning Area (**Figure 3**) (NMFS, 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. However, the 2010 *Deepwater Horizon* spill affected approximately one-third of the *Sargassum* habitat in the northern Gulf of Mexico (BOEM, 2014). It is unlikely that the entire 40,662,810 ha (100,480,000 ac) of *Sargassum* critical habitat would be affected by a large spill. Because *Sargassum* spp. is a floating, pelagic species, it would only be affected by impacts that occur near the surface.

The effects of oiling on *Sargassum* spp. vary with spill severity, but moderate to heavy oiling that could occur during a large spill could cause complete mortality to *Sargassum* and its associated communities (BOEM, 2017a). *Sargassum* spp. also has the potential to sink during a large spill, thus temporarily removing the habitat and possibly being an additional pathway of exposure to the benthic environment (Powers et al., 2013). Lower levels of oiling may cause sub-lethal affects, including a reduction in growth, productivity, and recruitment of organisms associated with *Sargassum* spp*.* The *Sargassum* spp. algae itself could be less impacted by light to moderate oiling than associated organisms because of a waxy outer layer that might help protect it from oiling (BOEM, 2016b) *Sargassum* spp. has a yearly seasonal cycle of growth and a yearly cycle of migration from the Gulf of 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* spp. community would be expected to occur within one to two years (BOEM, 2017a).

Impacts to sea turtles from a large hydrocarbon 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 hydrocarbons reached nesting beaches during nesting period(s), the level of mortality (and impact) would increase.

C.3.6 Piping Plover (Threatened)

The Piping Plover (*Charadrius melodus*) is a migratory shorebird that overwinters along the southeastern U.S. and Gulf of Mexico coasts. This Threatened species experienced declines in population as a result of hunting, habitat loss and modification, predation, and disease (U.S. Fish and Wildlife Service, 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, 2018). Critical overwintering habitat has been designated, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida (**Figure 4**). Piping Plovers inhabit coastal sandy beaches and mudflats, feeding by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening (U.S. Fish and Wildlife Service, nd).

A large hydrocarbon 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 Hydrocarbon Spill

The project area is approximately 63 statute miles (101 km) from the nearest shorelines designated as critical habitat for the Piping Plover (**Figure 4**). The 30-day OSRA modeling (**Table 4**) predicts that Piping Plover critical habitat in Plaquemines Parish, Louisiana could be contacted within 10 days of a spill (5% conditional probability). The 60-day OSRA modeling (**Table 5**) predicts that during the fall, there is a 24% conditional probability that a spill from the project area would reach a shoreline designated as critical habitat for the Piping Plover within 60 days of a spill.

Plovers could physically oil themselves while foraging on oiled shores or secondarily contaminate themselves through ingestion of oiled intertidal sediments and prey (BOEM, 2017a). Piping Plovers congregate and feed along tidally-exposed banks and shorelines, following the tidal boundary and foraging at the water's edge. It is possible that some deaths of Piping Plovers could occur, especially if spills occur during winter months when plovers are most common along the coastal Gulf or if spills contacted critical habitat. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. bp has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

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.

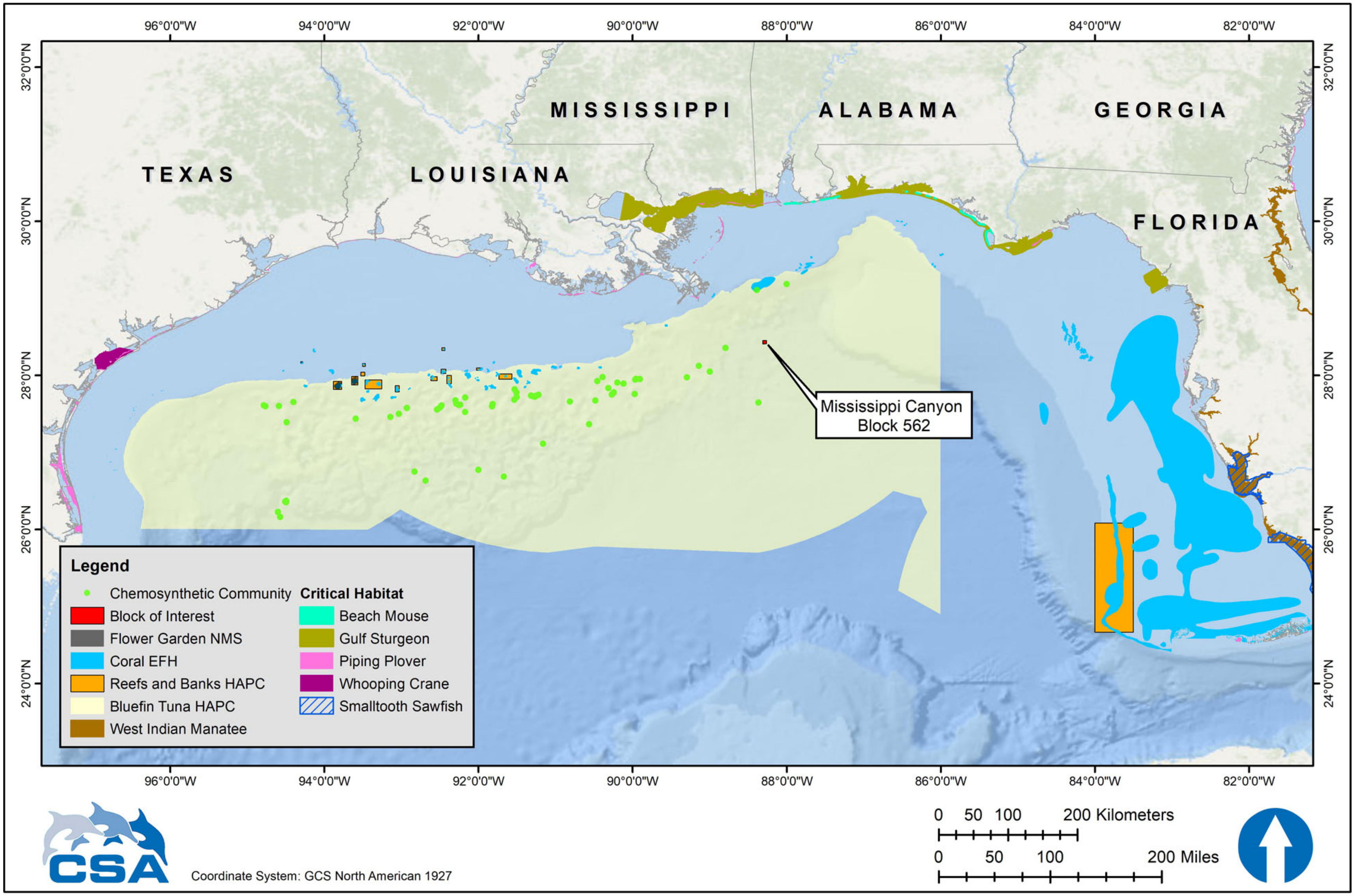


Figure 4. Location of selected environmental features in relation to the project area.

C.3.7 Whooping Crane (Endangered)

The Whooping Crane (*Grus americana*) is a large omnivorous wading bird listed as an endangered species. Three wild populations live in North America (National Wildlife Federation, 2016). One population overwinters along the Texas coast at Aransas NWR and summers at Wood Buffalo National Park in Canada. This population represents the majority of the world's population of free-ranging Whooping Cranes, reaching an estimated population of 506 at Aransas NWR during the 2019 to 2020 winter (USFWS, 2020b). Whooping Cranes breed, migrate, winter, and forage in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields (U.S. Fish and Wildlife Service, 2007). About 9,000 ha (22,240 ac) of salt flats on Aransas NWR and adjacent islands comprise the principal wintering grounds of the Whooping Crane. Aransas NWR is designated as critical habitat for the species.

A large hydrocarbon spill is the only IPF that potentially may affect Whooping Cranes. A small fuel spill in the project area would also be unlikely to affect Whooping Cranes, due to the distance from Aransas NWR. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior natural dispersion.

Impacts of a Large Hydrocarbon Spill

A large hydrocarbon spill is unlikely to affect Whooping Cranes as the project area is approximately 496 statute miles (798 km) from the Aransas NWR, which is the nearest designated critical habitat. The 30-day OSRA modeling (**Table 4**) predicts a <0.5% or less chance of oil contacting Whooping Crane critical habitat within 30 days of a spill. The 60-day OSRA model (**Table 5**) predicts that there is a <0.5% or less chance oil contacting Whooping Crane critical habitat within 60 days of a spill.

In the event of hydrocarbon 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. bp has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

C.3.8 Oceanic Whitetip Shark (Threatened)

The oceanic whitetip shark (*Carcharhinus longimanus*) was listed as Threatened under the ESA on 30 January 2018 (effective 30 March 2018) by NMFS (83 *FR* 4153). Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude, and 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; 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 construction vessel presence, sound, and lights, and a large hydrocarbon spill. Though 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 Construction Vessel Presence, Marine Sound, and Lights

Offshore installation activities produce a broad array of sounds at frequencies and intensities that may be detected by sharks including the threatened oceanic whitetip shark. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013) which includes sensitivities for individual species to SPLs between approximately 134 to 148 dB re 1 µPa in nurse sharks (*Ginglymostoma cirratum*) at frequencies between 100 and 1,000 Hz (Casper and Mann, 2006). These frequencies overlap with sound pressure levels associated with offshore oil and gas development activities (typically 10 Hz to 10 kHz) (Hildebrand, 2005). Impacts from offshore 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 sound pressure levels, 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 Hydrocarbon Spill

Information regarding the direct effects of hydrocarbons on elasmobranchs, including the oceanic whitetip shark are largely unknown. However, in the event of a large hydrocarbon 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 hydrocarbon 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) reported that the Flower Garden Banks serves as nursery habitat for aggregations of juvenile manta rays. At least 74 unique individuals have been positively identified at the Flower Garden Banks based on unique underbelly coloration (Flower Garden Banks National Marine Sanctuary, 2018). Genetic and photographic evidence in the Flower Garden Banks over 25 years of monitoring showed that 95% of identified giant manta ray male individuals were smaller than mature size (Stewart et al., 2018).

IPFs that may impact giant manta rays include construction vessel presence, marine sound, and lights, and a large hydrocarbon spill. Though 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 Construction Vessel Presence, Marine Sound, and Lights

Offshore installation activities produce a broad array of sounds at frequencies and intensities that may be detected by elasmobranchs including the threatened giant manta ray. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013). Studies indicate sensitivities to SPLs between approximately 139 and 153 dB re 1 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 pressure levels associated with offshore oil and gas development activities (typically 10 Hz to 10 kHz) (Hildebrand, 2005). Impacts from offshore 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 sound pressure levels, 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 Hydrocarbon Spill

A large hydrocarbon 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 hydrocarbon 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 only reside at depth.

In the event of a large hydrocarbon spill, due to the distance between the project area and the Flower Garden Banks, it is unlikely that a spill would impact the threatened giant manta ray nursery habitat. It is possible that a large hydrocarbon 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 (*Acipenser oxyrinchus desotoi*) is a Threatened fish species that inhabits major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida (Barkuloo, 1988; Wakeford, 2001). Sturgeon are anadromous fish that migrate from the 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 4**). A species description is presented by BOEM (2012a) and in the recovery plan for this species (USFWS et al., 1995).

A large hydrocarbon 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 that NMFS (2020a) estimated one non-lethal Gulf sturgeon collision in the 50 years of proposed action.

Impacts of a Large Hydrocarbon Spill

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

The project area is approximately 119 statute miles (192 km) from the nearest Gulf sturgeon critical habitat. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has 2% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 30 days. The 60-day OSRA modeling (**Table 5**) predicts that a spill in the project areas has a 19% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 60 days of a spill.

In the event of hydrocarbons 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 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 Yucatan Peninsula, and the Caribbean, including the U.S. Virgin Island and Puerto Rico (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 Hydrocarbon Spill

Based on the 60-day OSRA modeling results (**Table 5**), a large hydrocarbon spill would be unlikely (<0.5% probability) to reach Nassau grouper habitat in the Florida Keys (Monroe County, Florida). A spill would be unlikely to contact the corals of the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks and the difference in water depth between the project area the Banks. While on the surface, hydrocarbons would not be expected to contact subsurface fish.

In the unlikely event that hydrocarbons 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 4**). A species description is presented in the recovery plan for this species (NMFS, 2009b).

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

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

Impacts of a Large Hydrocarbon Spill

The project area is approximately 375 miles (604 km) from the nearest smalltooth sawfish critical habitat in Charlotte County, Florida. Based on the 30-day OSRA modeling (**Table 3**), coastal areas containing smalltooth sawfish critical habitat are unlikely to be affected within 30 days of a spill (<0.5% conditional probability). The 60-day OSRA modeling (**Table 4**) predicts a <0.5% probability of shoreline contact within 60 days of a spill between to coastal areas containing smalltooth sawfish critical habitat in Collier and Monroe counties, Florida.

Information regarding the direct effects of hydrocarbons on elasmobranchs, including the smalltooth sawfish are largely unknown. A recent study by Cave and Kajiura (2018) reported that when exposed the crude oil, the Atlantic stingray (*Hypanus sabinus*) experienced impaired olfactory function which could lead to decreased fitness. In the event of hydrocarbons 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. 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 2**. 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 hydrocarbon 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 Hydrocarbon Spill

Potential spill impacts on Endangered beach mice are discussed by BOEM (2017a). 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 123 statute miles (198 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% conditional probability of contacting any coastal areas containing beach mouse critical habitat within 30 days. The 60-day OSRA modeling (**Table 5**) predicts that a spill in the project area has an 18% or less conditional probability of contacting any coastal areas containing beach mouse critical habitat within 60 days of a spill.

In the event of hydrocarbons contacting these beaches, beach mice could experience several types of direct and indirect impacts. Contact with spilled hydrocarbons 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 hydrocarbons 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 (*Microtus pennsylvanicus dukecampbelli*) 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). 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 (U.S. Fish and Wildlife Service, 2001b).

A large hydrocarbon 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 Hydrocarbon Spill

Florida salt marsh vole habitat in Levy and Dixie counties, Florida is approximately 315 miles (507 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 voles within 30 days. The 60-day OSRA modeling (**Table 5**) predicts that a spill in the project area has 1% conditional probability of contacting any coastal areas containing beach mouse critical habitat within 60 days of a spill.

In the event of hydrocarbons contacting beaches containing these animals, Florida salt marsh voles could experience several types of direct and indirect impacts. Contact with spilled hydrocarbons 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 hydrocarbons 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 hydrocarbon 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 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).

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 hydrocarbon spill is the only relevant IPF.

Impacts of a Large Hydrocarbon Spill

Based on the 60-day OSRA modeling results (**Table 5**), a large hydrocarbon spill would be unlikely (<0.5% probability) to reach elkhorn coral critical habitat in the Florida Keys (Monroe County, Florida). A spill would be unlikely to contact the corals of the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 337 statute miles [542 km]), and the difference in water depth between the project area (1,962 m [6,436 ft]) and the Banks (approximately 17 to 145 m [56 to 476 ft]). While on the surface, oil would not be expected to contact corals growing on the seafloor but could feasibly impact planktonic larvae.

In the unlikely event that a slick reached reefs at the Flower Garden Banks or other Gulf of Mexico reefs, hydrocarbon droplets or contaminated sediment particles could come into contact with reef organisms or corals. As discussed by BOEM (2017a), impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; change in sediment characteristics; and reduction or loss of one or more commercial and recreational fishery habitats. Sub-lethal effects could be long-lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature and diseases) (BOEM, 2017a).

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

C.4 Coastal and Marine Birds

C.4.1 Marine Birds

Marine birds include seabirds and other species that may occur in the pelagic environment of the project area (Clapp et al., 1982a; Clapp et al., 1982b; 1983; 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, Least Tern, Sandwich Tern, Magnificent Frigatebird); winter residents (gannets, gulls, jaegers); and permanent resident species (Laughing Gulls, Royal Terns, Bridled Terns) (Davis et al., 2000).

Common marine bird species include Wilson's Storm-Petrel (*Oceanites oceanicus*), Magnificent Frigatebird (*Fregata magnificens*), Northern Gannet (*Morus bassanus*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Cory's Shearwater (*Calonectris diomedea*), Greater Shearwater (*Puffinus gravis*), and Audubon's Shearwater (*Puffinus lherminieri*). Seabirds are distributed Gulf-wide and are not specifically associated with the project area.

Relationships with hydrographic features were found for several marine bird species, possibly due to effects of hydrography on nutrient levels and productivity of surface waters where birds forage. The GulfCet II study did not estimate bird densities; however, Haney et al. (2014) indicated that marine bird densities over the open ocean were estimated to be 1.6 birds km^{-2}.

IPFs that potentially may affect marine birds include construction vessel presence, lighting, support vessel and helicopter traffic; and two types of accidents – a small fuel spill and a large hydrocarbon 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 Construction Vessel Presence, Marine Sound, and Lights

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

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may also be present in the project area. Migrant birds may use offshore structures, including platforms and semisubmersibles for resting, feeding, or as temporary shelter from inclement weather (Russell, 2005). Some birds may be attracted to offshore structures because of the lights and the fish populations that aggregate around these structures. A study in the North Sea indicated that rig lighting causes circling behavior in various birds, especially on cloudy nights; apparently the birds' geomagnetic compass is upset by the red part of the spectrum from the lights currently in use (Van de Laar, 2007; Poot et al., 2008). The numbers varied greatly, from none to some tens of thousands of birds per night per rig, with an apparent effect radius of up to 3 miles (5 km) (Poot et al., 2008). A study in the Gulf of Mexico also noted the phenomenon but did not recommend mitigation (Russell, 2005). One factor to consider in evaluating this impact in the Gulf of Mexico would include the lower incidence of cloudy and foggy days in the Gulf of Mexico versus the North Sea. In laboratory experiments, Poot et al. (2008) found the magnetic compass of migratory birds to be wavelength dependent. Migratory birds require light from the blue-green part of the spectrum for magnetic compass orientation, whereas red light (visible long-wavelength) disrupts their magnetic orientation. They designed a field study to test if and how changing light color influenced migrating birds under field conditions. During field studies they found that nocturnally migrating birds were disoriented and attracted by red and white light (containing visible long-wavelength radiation), whereas they were clearly less disoriented by blue and green light (containing less or no visible long-wavelength radiation) (Poot et al., 2008). Overall, potential negative impacts to birds from vessel lighting, collisions, or other adverse effects are highly localized (considering the single structure) and may affect individual birds during migration periods. Marine sound generated from the installation activities 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 (2017a). For this DOCD, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill is expected to be minimized by preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's and it's contractors' OSRP are 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, 2016a). 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 diesel fuel on the sea surface could experience direct physical and physiological effects including skin irritation; chemical burns of skin, eyes, and mucous membranes; and inhalation of VOCs. Due to the limited areal extent and short duration of water quality impacts from a small fuel spill, secondary impacts due to ingestion of oil via contaminated prey or reductions in prey abundance are unlikely. Due to the low densities of birds in open ocean areas, the small area affected, and the brief duration of the surface slick, no significant impacts on pelagic birds would be expected.

Impacts of a Large Hydrocarbon Spill

Potential spill impacts on marine and pelagic birds are discussed by BOEM (2017a). For this DOCD, there are no unique site-specific issues with respect to spill impacts on these animals.

Pelagic seabirds could be exposed to hydrocarbons from a spill. 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 provide relevant information about the species of pelagic birds that may be affected in the event of a large hydrocarbon spill. Birds that were treated for oiling include several pelagic species such as the Northern Gannet, Magnificent Frigatebird, and Masked Booby (U.S. Fish and Wildlife Service, 2011). The Northern Gannet is among the species with the largest numbers of birds affected by the spill. Exposure of marine birds to oil can result in adverse health with severity, depending on the level of oiling. Effects can range from plumage damage and loss of buoyancy from external oiling to more severe effects, such as organ damage, immune suppression, endocrine imbalance, reduced aerobic capacity, and death as a result of oil inhalation or ingestion (NOAA, 2016b).

C.4.2 Coastal Birds

Threatened and Endangered bird species (Piping Plover and Whooping Crane) have been discussed previously in **Sections C.3.6** and **C.3.7**. Various species of non-endangered birds are also found along the northern Gulf Coast, including diving birds, shorebirds, marsh birds, wading birds, and waterfowl. Gulf Coast marshes and beaches also provide important feeding and nesting habitats. Species that nest on beaches, flats, dunes, bars, barrier islands, and similar coastal and nearshore habitats include the Sandwich Tern, Wilson's Plover, Black Skimmer, Forster's Tern, Gull-Billed Tern, Laughing Gull, Least Tern, and Royal Tern (U.S. Fish and Wildlife Service, 2010).

The Eastern Brown Pelican (*Pelecanus occidentalis*) was delisted from federal Endangered status in 2009 (U.S. Fish and Wildlife Service, 2016). However, this species remains listed as endangered by the state of Mississippi (Mississippi Natural Heritage Program, 2018). The Brown Pelican was also delisted as a species of special concern by the State of Florida in 2017 (Florida Fish and Wildlife Conservation Commission, 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). Nearly half the southeastern population of Brown Pelicans lives in the northern Gulf Coast, generally nesting on protected islands (U.S. Fish and Wildlife Service, 2010).

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

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

Impacts of Support Vessel and Helicopter Traffic

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

Vessel traffic may disturb some foraging and resting birds. Flushing distances vary among species and among individuals (Rodgers and Schwikert, 2002; 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 installation activities, any short-term impacts are not expected to be significant to coastal bird populations.

Helicopter traffic can cause some disturbance to birds onshore and offshore. Responses are highly dependent on the type of aircraft, the bird species, the activities that the animals were previously engaged in, and previous exposures to overflights (Efromyson et al., 2003). Helicopters seem to cause the most intense responses over other human disturbances (Bélanger and Bédard, 1989; 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-ft altitude minimum is greater than the distance (slant range) at which aircraft overflights have been reported to cause behavioral effects on most species of birds studied by Efroymson et al. (2000). 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 Hydrocarbon Spill

The 30-day OSRA results summarized in **Table 4** estimate that Lafourche and Plaquemines Parishes, Louisiana, could be contacted within 10 days (1% to 5% conditional probabilities) and Louisiana and Florida shorelines could be affected within 30 days (1% to 11% conditional probability). The 60-day OSRA modeling (**Table 5**) predicts that shorelines between Matagorda County, Texas, and Levy County, Florida, have up to a 24% probability of contact within 60 days of a spill.

Coastal birds can be exposed to hydrocarbons as they float on the water surface, dive during foraging, or wade in oiled coastal waters. Oiled birds can lose the ability to fly, dive for food, or float on the water, which could lead to drowning (U.S. Fish and Wildlife Service, 2010). Oil interferes with the water repellency of feathers and can cause hypothermia 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 hydrocarbons by feeding on carcasses of contaminated fish and wildlife. While ingestion can kill animals immediately, more often it results in lung, liver, and kidney damage, which can lead to death (BOEM, 2017a). Bird eggs may be damaged if an oiled adult sits on the nest.

Brown and White Pelicans are especially at risk from direct and indirect impacts from spilled hydrocarbons 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 or has ingested hydrocarbons. Issues for Brown and White Pelicans include direct contact with hydrocarbons, disturbance by cleanup activities, and long-term habitat contamination (BOEM, 2017a).

The Bald Eagle may also be at risk from direct and indirect impacts from spilled hydrocarbons. 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 or has ingested hydrocarbons (BOEM, 2017a). It is expected that impacts to coastal birds from a large hydrocarbon 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 construction vessel presence, marine sound, and lights; effluent discharges; water intake; and two types of accidents (a small fuel spill and a large hydrocarbon spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Construction Vessel Presence, Marine Sound, and Lights

The construction vessel, as a floating structure in the deepwater environment, will act as a fish aggregating device (FAD). In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990; Higashi, 1994; Relini et al., 1994). Positive fish associations with offshore structures in the Gulf of Mexico are well documented (Gallaway and Lewbel, 1982; Wilson et al., 2003; Edwards and Sulak, 2006; Wilson et al., 2006). The FAD effect could possibly enhance the feeding of epipelagic predators by attracting and concentrating smaller fish species. Construction 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 sounds 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 SPL_{rms} threshold levels 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 of temporary auditory threshold shifts. However, no quantitative behavioral thresholds for non-impulsive sources for fish have been established (Hawkins and Popper, 2014). Rather, Popper et al. (2014) provide qualitative criteria portraying risk of impact relative to the animal's distance from the source (i.e., near, intermediate, far). 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 aggregating is likely to occur to some degree due to the presence of the construction 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 sounds as they are less mobile and unable to move away from the source (Popper et al., 2014). Larval fish were experimentally exposed to simulated impulsive sounds by Bolle et al. (2012). The controlled playbacks produced SEL_{cum} of 206 dB re 1 μPa^2 s but resulted in no increased mortality between the exposure and control groups. Non-impulsive sources (such as construction vessel operations) are expected to be far less injurious than impulsive sources. Because of the periodic and transient nature of ichthyoplankton and the stationary nature of the source, no impacts to these life stages are expected.

Impacts of Effluent Discharges

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/VGP permit, such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water, are expected to be diluted rapidly and have little or no impact on water column biota.

Impacts of Water Intake

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the construction vessel. The intake of seawater for cooling water will entrain plankton. The low intake velocity should allow most strong-swimming juvenile fishes and smaller adults to escape entrainment or impingement (Electric Power Research Institute, 2000). However, drifting plankton would not be able to escape entrainment with the exception of a few fast-swimming larvae of certain taxonomic groups. Those organisms entrained may be stressed or killed (Cada, 1990; Mayhew et al., 2000), primarily through changes in water temperature during the route from cooling intake structure to discharge structure and mechanical damage (turbulence in pumps and condensers). Due to the limited scope and short duration of installation activities, any short-term impacts of entrainment are not expected to be significant to plankton or ichthyoplankton populations (BOEM, 2017a). The construction vessel ultimately chosen for this project is expected to be in compliance with all cooling water intake requirements.

Impacts of a Small Fuel Spill

Potential spill impacts on fisheries resources are discussed by BOEM (2017a). For this DOCD, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's and it's contractors' OSRP are 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 and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would dissipate naturally within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on phytoplankton, zooplankton, and nekton. Due to the limited areal extent and short duration of water quality impacts, a small fuel spill would be unlikely to produce detectable impacts on pelagic communities and ichthyoplankton.

Impacts of a Large Hydrocarbon Spill

Potential spill impacts on pelagic communities and ichthyoplankton are discussed by BOEM (2017a). A large hydrocarbon 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 hydrocarbons. 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).

Hydrocarbon 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. 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 a spill.

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). Zooplankton may also accumulate PAHs through diffusion from surrounding waters, direct ingestion of micro-droplets (e.g., Berrojalbiz et al., 2009; Lee et al., 2012; Lee, 2013), and by ingestion of droplets that are attached to phytoplankton (Almeda et al., 2013). 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 hydrocarbon 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, and growth to maturity. Under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, federal agencies are required to consult on activities that may adversely affect EFH designated in Fishery Management Plans developed by the regional Fishery Management Councils.

The Gulf of Mexico Fishery Management Council (GMFMC) has prepared Fishery Management Plans for corals and coral reefs, shrimps, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum. In 2005, the EFH for these managed species was redefined in Generic Amendment No. 3 to the various Fishery Management Plans (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 44 statute miles (71 km) from the project area (**Figure 4**).

Highly migratory pelagic fishes, which occur as transients in the project area, are the only remaining group for which EFH has been identified in the deepwater Gulf of Mexico. Species in this group, including tunas, swordfishes, billfishes, and sharks, are managed by NMFS. **Table 8** lists the highly migratory fish species and their life stages with EFH at or near the project area.

Table 8. Migratory fish species with designated Essential Fish Habitat (EFH) at or near Mississippi Canyon Block 562, including life stage(s) potentially present within the project area.

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

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna (*Thunnus thynnus*), and (NMFS, 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 4**). 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).

NTLs 2009-G39 and 2009-G40 that provide guidance and clarification of the regulations with respect to biologically sensitive underwater features and areas and benthic communities that are considered EFH. As part of an agreement between BOEM and NMFS to complete a new programmatic EFH consultation for each new Five-Year Program, an EFH consultation was initiated between BOEM's Gulf of Mexico Region and NOAA's Southeastern Region during the preparation, distribution, and review of BOEM's 2017-2022 WPA/CPA Multisale EIS (BOEM, 2017a). The EFH assessment was completed and there is ongoing coordination among NMFS, BOEM, and BSEE, including discussions of mitigation (BOEM, 2016c).

Other HAPCs 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. Madison Swanson Marine Reserve is the HAPC located nearest to the project area (approximately 153 statute miles [246 km]).

IPFs that potentially may affect EFH include construction vessel presence, marine sound, and lights; effluent discharges; water intake; and two types of accidents (a small fuel spill and a large hydrocarbon spill).

Impacts of Construction Vessel Presence, Marine Sound, and Lights

The construction vessel, as a floating structure in the deepwater environment, will act as a FAD. In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990; Higashi, 1994; Relini et al., 1994; Gates et al., 2017). The FAD effect would likely attract and concentrate smaller fish species and thus enhance feeding of epipelagic predators.

Construction 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 sources 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 SPL_{rms} threshold levels of 170 dB re 1 µPa accumulated over a 48-hour period for onset of recoverable injury and 158 dB re 1 µPa accumulated over a 12-hour period for onset temporary auditory threshold shifts. No quantitative behavioral thresholds for non-impulsive sources for fish have been established. Rather, Popper et al. (2014) provide qualitative criteria portraying risk of impact relative to the animal's distance from the source (i.e., near, intermediate, far). Because the construction vessel is a temporary structure, any impacts on EFH for managed species are considered minor.

Impacts of Effluent Discharges

Other effluent discharges affecting EFH by diminishing ambient water quality include treated sanitary and domestic wastes, deck drainage, and miscellaneous discharges such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water. Impacts on water quality have been discussed previously. No significant impacts on EFH for managed species are expected from these discharges.

Impacts of Water Intake

As noted previously, cooling water intake will cause entrainment and impingement of plankton, including fish eggs and larvae (ichthyoplankton). Due to the limited scope and short duration of installation activities, any short-term impacts on EFH for highly migratory pelagic fishes are not expected to be biologically significant. The recent lease sale EIS (BOEM, 2017a) discusses cooling water discharge. Water with an elevated temperature may accumulate around the discharge pipe. However, the warmer water should be diluted rapidly to ambient temperature levels within 100 m (328 ft) of the discharge pipe. Any impacts to pelagic species would be extremely localized and brief (BOEM, 2014).

Impacts of a Small Fuel Spill

Potential spill impacts on EFH are discussed by BOEM (2017a). For this DOCD, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's and it's contractors' OSRP are expected to help diminish the potential for impacts on EFH. DOCD Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be dissipated naturally within 24 hours (NOAA, 2017). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on EFH for highly migratory pelagic fishes, including tunas, swordfishes, billfishes, and sharks. These species occur as transients in the project area. A spill would also produce short-term impact on water quality in the HAPC for spawning bluefin tuna, which covers much of the deepwater Gulf of Mexico. The areal extent of the affected area would represent a negligible portion of the HAPC.

A small fuel spill would likely not affect EFH for corals and coral reefs, the nearest EFH being the topographic features located approximately 44 statute miles (71 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 Hydrocarbon Spill

Potential spill impacts on EFH are discussed by BOEM (2017a). For this DOCD, there are no unique site-specific issues with respect to EFH.

A hydrocarbon 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 (GMFMC, 2005; NMFS, 2009c), some impact on EFH would be unavoidable.

A large spill could affect EFH for many managed species including shrimps, stone crab, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum. It would result in adverse impacts on water quality and water column biota including phytoplankton, zooplankton, and nekton. In coastal waters, sediments could be contaminated and result in persistent degradation of the seafloor habitat for managed demersal fish and shellfish species.

The project area is within the HAPC for spawning Atlantic bluefin tuna (NMFS, 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 44 statute miles (71 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 this area, since a surface slick would be unlikely to reach these features due to their depth.

C.6 Archaeological Resources

C.6.1 Shipwreck Sites

The archeological assessment identified no archaeologically significant artifacts or shipwrecks within 610 m (2,000 ft) of the proposed activities based on an autonomous underwater vehicle (AUV) survey (bp, 2020). bp and its contractors will abide by the applicable requirements of NTL 2005-G07 and 30 CFR § 550.194(c), which stipulate that work be stopped at the project site if any previously undetected archaeological resource is discovered after work has begun until appropriate surveys and evaluations have been completed. This NTL was reissued in June 2020 to comply with Executive Order 13891 of October 9, 2019 and to rescind NTL 2011-JOINT-G01.

Because there are no shipwreck sites within 610 m (2,000 ft) of the proposed activities, there are no routine IPFs that are likely to affect shipwrecks. Impacts of a large hydrocarbon spill are the only IPFs considered. A small fuel spill would not affect shipwrecks because the diesel would float and dissipate on the sea surface. These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of a Large Hydrocarbon Spill

Because there are no historic shipwrecks within a 300-m (984-ft) radius of the location of the proposed activities and the WCD for the proposed activities consists of a surface spill of diesel fuel and not a seafloor blowout, impacts from dispersed sediments would not be relevant. Should there be any indication that potential shipwreck sites could be affected, in accordance with NTL 2005-G07, bp will immediately halt project operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor, Leasing and Environment, within 48 hours of its discovery. bp would cease all operations within 305 m (1,000 ft) of the site until the Regional Supervisor provides instructions on steps to take to assess the site's potential historic significance and protect it.

There is the potential for impacts from diesel fuel and depleted oxygen levels. These impacts could include chemical contamination as well as alteration of the rates of microbial activity (BOEM, 2017a, b). A spill entering shallow coastal waters could conceivably contaminate an undiscovered or known coastal shipwreck site. BOEM (2012a) stated that if a 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 activities of approximately 1,962 m (6,436 ft) (bp, 2020), the location is well beyond the 60-m (197-ft) depth contour used by BOEM as the seaward extent for potential prehistoric archaeological sites in the Gulf of Mexico. Because prehistoric archaeological sites are not found in the project area, the only relevant IPF is a large hydrocarbon spill. A small fuel spill would not affect prehistoric archaeological resources because the diesel would float and dissipate on the sea surface.

Impacts of a Large Hydrocarbon Spill

Along the northern Gulf Coast, prehistoric sites exist along the barrier islands and mainland coast and along the margins of bays and bayous (BOEM, 2017a). Based on the 30-day OSRA modeling (**Table 4**), Plaquemines and Lafourche Parishes may be affected within 10 days of a spill (1% to 5% conditional probability) and coastal areas between Cameron Parish, Louisiana, and Bay County, Florida, may be affected within 30 days (1% to 11% conditional probability). The 60-day OSRA modeling (**Table 5**) predicts that shorelines between Matagorda County, Texas, and Levy County, Florida, have up to a 24% probability of contact within 60 days of a spill.

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

C.7 Coastal Habitats and Protected Areas

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

Impacts of support vessel traffic and a large hydrocarbon spill are the only IPFs analyzed for coastal habitats and protected areas. A small fuel spill in the project area would be unlikely to affect coastal habitats, as the project area is 64 statute miles (103 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Support Vessel Traffic

Support operations, including crew boats and supply boats as detailed in DOCD Section 13, may have a minor incremental impact on barrier beaches and dunes, wetlands, oyster reefs and protected areas. Over time, with a large number of vessel trips, vessel wakes can erode shorelines along inlets, channels, and harbors, resulting in localized land loss. Impacts to barrier beaches and dunes, wetlands, oyster reefs and protected areas will be minimized by following the speed and wake restrictions in harbors and channels.

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

Impacts of a Large Hydrocarbon Spill

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

The 30-day OSRA modeling (**Table 4**) indicates that Plaquemines Parish, Louisiana, with an 11% conditional probability, is the coastal area most likely to be contacted within 30 days of a spill. The 60-day OSRA modeling (**Table 5**) predicts that shorelines between Matagorda County, Texas, and Levy County, Florida, have up to a 24% probability of contact within 60 days of a spill.

The shorelines within the geographic range predicted by the OSRA modeling (**Tables 4** and **5**) include extensive barrier beaches and wetlands, oyster reefs with submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries. NWRs and other protected areas along the coast are discussed in BOEM (2017a) and bp's OSRP. Coastal and near-coastal wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts based on the 30-day OSRA model (**Table 4**) are presented in **Table 9**.

The level of impacts from hydrocarbon spills on coastal habitats depends on many factors, including the oil characteristics, the geographic location of the landfall, and the weather and oceanographic conditions at the time (BOEM, 2017a,b).

Table 9. Wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts after 30 days of a hypothetical spill from Launch Area 59 based on the 30-day OSRA model.

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Cameron, Louisiana	Sabine National Wildlife Refuge
	Rockefeller State Wildlife Refuge and Game Preserve
	Peveto Woods Sanctuary
Vermilion, Louisiana	Paul J. Rainey Wildlife Refuge and Game Preserve
	Rockefeller State Wildlife Refuge and Game Preserve
	State Wildlife Refuge
Terrebonne, Louisiana	Isles Dernieres Barrier Islands Refuge
	Pointe aux Chenes Wildlife Management Area
Lafourche, Louisiana	East Timbalier Island National Wildlife Refuge
	Pointe aux Chenes Wildlife Management Area
	Wisner Wildlife Management Area (Includes Picciola Tract)
Jefferson, Louisiana	Grand Isle State Park
Plaquemines, Louisiana	Breton National Wildlife Refuge
	Delta National Wildlife Refuge
	Pass a Loutre Wildlife Management Area

Table 9. (Continued).

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
St. Bernard, Louisiana	Biloxi Wildlife Management Area
	Breton National Wildlife Refuge
	Saint Bernard State Park
Walton, Florida	Choctawhatchee River Delta Preserve
	Choctawhatchee River Water Management Area
	Deer Lake State Park
	Grayton Beach State Park
	Point Washington State Forest
	Topsail Hill Preserve State Park
Bay, Florida	Camp Helen State Park
	SS Tarpon Underwater Archaeological Preserve
	St. Andrews Aquatic Preserve
	St. Andrews State Park
	Vamar Underwater Archaeological Preserve

C.8 Socioeconomic and Other Resources

C.8.1 Recreational and Commercial Fishing

Potential impacts to recreational and commercial fishing are analyzed by BOEM (2017a). The main commercial fishing activity in deep waters of the northern Gulf of 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. In August 2000, the federal government closed two areas in the northeastern Gulf of Mexico to longline fishing (65 *FR* 47214). The lease is outside of the closure areas.

Longline gear consists of monofilament line deployed from a moving vessel and generally allowed to drift for 4 to 5 hours (Continental Shelf Associates, 2002). As the mainline is put out, baited leaders and buoys are clipped in place at regular intervals. It takes 8 to 10 hours to deploy a longline and about the same time to retrieve it. Longlines are often set near oceanographic features such as fronts or downwellings, with the aid of sophisticated on-board temperature sensors, depth finders, and positioning equipment. Vessels typically are 10 to 30 m (33 to 98 ft) long, and their trips last from about 1 to 3 weeks.

It is unlikely that any commercial fishing activity other than longlining occurs at or near the project area. Benthic species targeted by commercial fishers occur on the upper continental slope, well inshore of the project area. Royal red shrimp (*Pleoticus robustus*) are caught by trawlers in water depths of about 250 to 550 m (820 to 1,804 ft) (Stiles et al., 2007). Tilefishes (primarily *Lopholatilus chamaeleonticeps*) are caught by bottom longlining in water depths from about 165 to 450 m (540 to 1,476 ft) (Continental Shelf Associates, 2002).

Most recreational fishing activity in the region occurs in water depths less than 200 m (656 ft) (Continental Shelf Associates, 1997; 2002; Keithly and Roberts, 2017). In deeper water, the main attraction to recreational fishers would be petroleum platforms offshore Texas and Louisiana. Due to the distance from shore, it is unlikely that recreational fishing activity is occurring in the project area.

The only IPFs associated with routine operations that potentially may affect fisheries is construction vessel presence which may present an entanglement risk for longline fisheries. Two types of potential accidents are also addressed below (a small fuel spill and a large hydrocarbon spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Construction Vessel Presence, Marine Sound, and Lights

There is a slight possibility of pelagic longlines drifting into and becoming entangled in the construction. For example, in January 1999, a portion of a pelagic longline snagged on the acoustic Doppler current profiler of a drillship working in the Gulf of Mexico (Continental Shelf Associates, 2002). The line was removed without incident. Generally, longline fishers use radar and are aware of offshore structures and ships when placing their sets. Therefore, little or no impact on pelagic longlining is expected.

Because it is unlikely that any recreational fishing activity is occurring in the project area, no adverse impacts are anticipated. Other factors such as effluent discharges are likely to have negligible impacts on commercial or recreational fisheries due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges.

Impacts of a Small Fuel Spill

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's and it's contractors' OSRP are expected to potentially mitigate and reduce the potential for impacts. DOCD Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

Pelagic longlining activities in the project area, if any, could be interrupted in the event of a small fuel spill. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions (see **Section A.9.1**). Fishing activities could be interrupted due to the activities of response vessels operating in the project area. A small fuel spill would not affect coastal water quality because the spill would not be expected to make landfall or reach coastal waters prior to dissipating (see **Section A.9.1**).

Impacts of a Large Hydrocarbon Spill

Potential spill impacts on fishing activities are discussed by BOEM (2017a). 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 would not likely be interrupted in the event of a large hydrocarbon spill because most of the diesel fuel is expected to quickly evaporate or dissipate.

According to BOEM (2012a; 2017a), the potential impacts on commercial and recreational fishing activities from a spill are anticipated to be minimal because the potential for oil spills is very low, the most typical events are small and of short duration, and the effects are so localized that fishes are typically able to avoid the affected area. Fish populations may be affected by a 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 hydrocarbon spill occur, economic impacts on commercial and recreational fishing activities would likely occur, but are difficult to predict because impacts would differ by fishery and season (BOEM, 2016b).

C.8.2 Public Health and Safety

There are no IPFs associated with routine operations that are expected to affect public health and safety. Impacts of a large hydrocarbon spill are addressed below. A small fuel spill would be unlikely to cause any impacts on public health and safety because it would affect only a small area of the open ocean 64 statute miles (103 km) from the nearest shoreline, and nearly all of the diesel fuel would evaporate or disperse naturally within 24 hours (see **Section A.9.1**).

Impacts of a Large Hydrocarbon Spill

In the event of a large spill, 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, diesel fuel evaporates and dissipates rapidly. Depending on many factors such as spill rate, duration, and location, the physical/chemical characteristics of the oil, meteorological, and oceanographic conditions at the time, and the effectiveness of spill response measures, diesel may remain present on the sea surface and reach coastal shorelines.

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 infrastructure installation with support from existing shorebase facilities in Louisiana. No new or expanded facilities will be constructed, and no new employees are expected to move permanently into the area. The project will have a negligible impact on socioeconomic conditions such as local employment, existing offshore and coastal infrastructure (including major sources of supplies, services, energy, and water), and minority and lower income groups. Impacts of a large hydrocarbon spill are addressed below. A small fuel spill that dissipates within a few days would have little or no economic impact as the spill response would use existing facilities, resources, and personnel.

Impacts of a Large Hydrocarbon Spill

Potential socioeconomic impacts of a spill are discussed by BOEM (2017a). 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, 2017a). Net employment impacts from a spill would not be expected to exceed 1% of baseline employment in any given year (BOEM, 2017a).

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 construction 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 Hydrocarbon Spill

Potential impacts of a hydrocarbon spill on recreation and tourism are discussed by BOEM (2017a). 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 Lafourche and Plaquemines parishes could be contacted within 10 days (1% to 5% conditional probability) and other Louisiana and Florida shorelines could be affected within 30 days (1% to 2% conditional probability). The 60-day OSRA modeling (**Table 5**) predicts that shorelines between Matagorda County, Texas, and Levy County, Florida, have up to a 24% probability of contact within 60 days of a spill.

According to BOEM (2017a), should an a spill occur and contact a beach area or other recreational resource, it could cause some disruption during the impact and cleanup phases of the spill. In the unlikely event that a spill occurs that is sufficiently large to affect large areas of the coast and, through public perception, have effects that reach beyond the damaged area, effects to recreation and tourism could be significant (BOEM, 2012a).

C.8.5 Land Use

Land use along the northern Gulf coast is discussed by BOEM (2017a). There are no routine IPFs that potentially may affect land use. The project will use existing onshore support facilities in Louisiana. The land use at the existing shorebase sites is industrial. The project will not involve any new construction or changes to existing land use and, therefore, will not have any impacts. Levels of boat and helicopter traffic as well as demand for goods and services including scarce coastal resources, will represent a small fraction of the level of activity occurring at the shorebases.

A large hydrocarbon 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 Hydrocarbon Spill

The initial response for a large hydrocarbon spill would be staged out of existing facilities, with no effect on land use. A large spill could have limited temporary impacts on land use along the coast if additional staging areas were needed.

An accidental 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.

C.8.6 Other Marine Uses

The project area is not located within any USCG-designated fairway or shipping lane or Military Warning Area. bp and its contractors intend to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft. The site clearance letters for the proposed activities identified existing seafloor infrastructure in the vicinity but no impacts on existing infrastructure are expected. The archaeological survey reported no archaeologically significant sonar contacts were identified within 610 m (2,000 ft) of the proposed activities (bp, 2020).

There are no IPFs from routine project activities that are likely to affect other marine uses of the project area. A large hydrocarbon spill is the only relevant accident IPF. A small fuel spill would not have any impacts on other marine uses because spill response activities would be mainly within the project area and the duration would be brief.

Impacts of a Large Hydrocarbon Spill

An accidental spill would be unlikely to significantly affect shipping or other marine uses. MC 562 is not located within any USCG-designated fairway or shipping lane. In the event of a large spill requiring numerous response vessels, coordination would be required to manage the vessel traffic for safe operations. 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.

In the event of a large spill requiring numerous vessels in the area, coordination would be required to ensure that no anchoring or seafloor-disturbing activities occur near the existing infrastructure.

C.9 Cumulative Impacts

For purposes of the National Environmental Policy Act, a cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7). Any single activity or action may have a negligible impact(s) by itself, but when combined with impacts from other activities in the same area and/or time period, substantial impacts may result.

Prior Studies. BOEM prepared a multi-lease sale EIS in which it analyzed the environmental impact of activities that might occur in the multi-lease sale area. The level and types of activities planned in bp's DOCD are within the range of activities described and evaluated by BOEM in the 2017 to 2022 Programmatic Environmental Impact Statement for the Outer Continental Shelf (OCS) Oil and Gas Leasing Program (BOEM, 2016a), and the Final Programmatic EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2017-2022 (BOEM, 2017a). Past, present, and reasonably foreseeable activities were identified in the cumulative effects scenario of these documents, which are incorporated by reference. The proposed action should not result in any additional impacts beyond those evaluated in the multi-lease sale and Final EISs (BOEM, 2012a; 2013; 2014; 2015; 2016b; 2017a).

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

Cumulative Impacts of Activities in this DOCD. The BOEM (2017a) 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 this 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 cumulative impacts analysis in these prior analyses is not expected to be significant.

D. Environmental Hazards

D.1 Geologic Hazards

The site clearance letter provided by bp did not identify geologic hazards at the location of the proposed activities (bp, 2020). 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 construction vessel selected for this project. High winds and limited visibility during a severe storm could disrupt support activities (vessel and helicopter traffic) and make it necessary to suspend some activities on the construction vessel for safety reasons until the storm or weather event passes. bp has several contingency plans in place to address unexpected conditions. In the event of severe weather, guidance as outlined in bp's and/or bp's contractor's site specific EEP, 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

Metocean conditions such as sea states, wind speed, ocean currents, etc. will be continuously monitored. Under most circumstances, physical oceanographic conditions are not expected to have any effect on the proposed activities. Strong currents (e.g., caused by Loop Current eddies and intrusions) and large waves were considered in the design criteria for the construction 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 installation 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 construction 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 selection of the construction vessel, were considered by bp. The activity being proposed is the result of a rigorous screening and right-scoping process. It was selected as the best design candidate to reduce risk and optimize deliverability, chosen from numerous options with varying construction designs, 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 contractors intend to implement the following specific measures to prevent marine pollution:

- Proper job planning is an important overall mitigation measure. The fundamental concept and discussion in the pre-tour and pre-job safety meetings is the prevention of harm to people 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 (SEMS) requirements, the skills and knowledge of personnel are assessed prior to working offshore for bp.
- 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 contractors' established waste management procedures. Wastes are expected to be categorized, packaged, labeled, stored, manifested, and shipped to an appropriately permitted disposal site.
- Drums will be stored in containment areas, and fuel vents will have containment boxes.
- Trash containers will be kept covered. Trash will be disposed of in a compactor and shipped to shore via a rig support vessel.

- Tank overflow, discharge overflow spill prevention fittings as well as quick disconnect hoses will be installed on hydrocarbon-based fluid hoses 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, and may engage the IMT onshore to measure the effectiveness and quality of processes deployed to address spill scenarios.

G. Consultation

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

H. Preparers

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

- John M. Tiggelaar II (Project Scientist);
- Kathleen Gifford (Project Scientist);
- Brian Diunizio (GIS/Remote Sensing Specialist); and
- Kristen L. Metzger (Library and Information Services Director).

I. References

Abbriano, R.M., M.M. Carranza, S.L. Hogle, R.A. Levin, A.N. Netburn, K.L. Seto, S.M. Snyder, and P.J.S. Franks. 2011. *Deepwater Horizon* oil spill: A review of the planktonic response. Oceanography 24(3): 294-301.

Almeda, R., Z. Wambaugh, Z. Wang, C. Hyatt, Z. Liu, and E.J. Buskey. 2013. Interactions between zooplankton and crude oil: toxic effects and bioaccumulation of polycyclic aromatic hydrocarbons. PLoS ONE 8(6): e67212.

Anderson, C.M., M. Mayes, and R. LaBelle. 2012. Update of Occurence Rates for Offshore Oil Spills. U.S. Department of the Interior, Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement. OCS Report BOEM 2012-069, BSEE 2012-069.

Auffret, M., M. Duchemin, S. Rousseau, I. Boutet, A. Tanguy, D. Moraga, and A. Marhic. 2004. Monitoring of immunotoxic responses in oysters reared in areas contaminated by the Erika oil spill. Aquatic Living Resources 17(3): 297-302.

Azzara, A.J., W.M. von Zharen, and J.J. Newcomb. 2013. Mixed-methods analytic approach for determining potential impacts of vessel noise on sperm whale click behavior. Journal of the Acoustical Society of America 134(6): 4566-4574.

Barkaszi, M.J., M. Butler, R. Compton, A. Unietis, and B. Bennett. 2012. Seismic Survey Mitigation Measures and Marine Mammal Observer Reports. New Orleans, LA. OCS Study BOEM 2012-015.

Barkaszi, M.J. and C.J. Kelly. 2019. Seismic Survey Mitigation Measures and Protected Species Observer Reports: Synthesis Reports. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study BOEM 2019-012. 141 pp + apps.

Barkuloo, J.M. 1988. Report on the Conservation Status of the Gulf of Mexico sturgeon, *Acipenser oxyrinchus desotoi*. U.S. Department of the Interior, U.S. Fish and Wildlife Service. Panama City, FL.

Baum, J.K. and R.A. Myers. 2004. Shifting baselines and the decline of pelagic sharks in the Gulf of Mexico. Ecology Letters 7(2): 135-145.

Beerkircher, L., C.A. Brown, and V. Restrepo. 2009. Pelagic observer program data summary, Gulf of Mexico bluefin tuna (*Thunnus thynnus*) spawning season 2007 and 2008; and analysis of observer coverage levels. NOAA Technical Memorandum NMFS-SEFSC-588. 33 pp.

Bélanger, L. and J. Bédard. 1989. Responses of staging greater snow geese to human disturbance. Journal of Wildlife Management 53(3): 713-719.

Bellas, J., L. Saco-Álvarez, Ó. Nieto, J.M. Bayona, J. Albaigés, and R. Beiras. 2013. Evaluation of artificially-weathered standard fuel oil toxicity by marine invertebrate embryo-genesis bioassays. Chemosphere 90: 1103-1108.

Berrojalbiz, N., S. Lacorte, A. Calbet, E. Saiz, C. Barata, and J. Dachs. 2009. Accumulation and cycling of polycyclic aromatic hydrocarbons in zooplankton. Environmental Science & Technology 43: 2295-2301.

Berry, M., D.T. Booth, and C.J. Limpus. 2013. Artificial lighting and disrupted sea-finding behaviour in hatchling loggerhead turtles (*Caretta caretta*) on the Woongarra coast, south-east Queensland, Australia. Australian Journal of Zoology 61(2): 137-145.

Biggs, D.C. and P.H. Ressler. 2000. Water column biology. In: Deepwater Gulf of Mexico Environmental and Socioeconomic Data Search and Literature Synthesis. Volume I: Narrative Report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2000-049. 340 pp.

BirdLife International 2018. *Charadrius melodus* . The IUCN Red List of Threatened Species 2018. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22693811A131930146.en.

Blackburn, M., C.A.S. Mazzacano, C. Fallon, and S.H. Black. 2014. Oil in Our Oceans. A Review of the Impacts of Oil Spills on Marine Invertebrates. The Xerces Society for Invertebrate Conservation, Portland, OR. 160 pp.

Blackstock, S.A., J.O. Fayton, P.H. Hulton, T.E. Moll, K. Jenkins, S. Kotecki, E. Henderson, V. Bowman, S. Rider, and C. Martin. 2018. Quantifying Acoustic Impacts on Marine Mammals and Sea Turtles: Methods and Analytical Approach for Phase III Training and Testing. NUWC-NPT Technical Report August 2018. N.U.W.C. Division. Newport, RI. 109 pp.

Blackwell, S.B. and C.R. Greene Jr. 2003. Acoustic measurements in Cook Inlet, Alaska, during August 2001. Greeneridge Sciences, Inc., for NMFS, Anchorage, AK. 43 pp.

Bolle, L.J., C.A.F. de Jong, S.M. Bierman, P.J.G. Van Beek, O.A. van Keeken, P.W. Wessels, C.J.G. van Damme, H.V. Winter, D. de Haan, and R.P.A. Dekeling. 2012. Common sole larvae survive high levels ofp pile-driving sound in controlled exposure experiments. PLoS One 7(3): e33052.

Bonde, R.K. and T.J. O'Shea. 1989. Sowerby’s beaked whale (*Mesoplodon bidens*) in the Gulf of Mexico. Journal of Mammology 70: 447-449.

bp. 2020. bp Western Hemisphere New Wells Delivery Team. Site Clearance Letter. Proposed Development Well Locations MC 562 "C" and MC 562 "D", Block 562, OCS-G-19966, Mississippi Canyon Area.

Brame, A.B., T.R. Wiley, J.K. Carlson, S.V. Fordham, R.D. Grubbs, J. Osborne, R.M. Scharer, D.M. Bethea, and G.R. Poulakis. 2019. Biology, ecology, and status of the smalltooth sawfish *Pristis pectinata* in the USA. Endangered Species Research 39: 9-23.

Brooke, S. and W.W. Schroeder. 2007. State of deep coral ecosystems in the Gulf of Mexico region: Texas to the Florida Straits, pp 271-306. In: S.E. Lumdsen, T.F. Hourigan, A.W. Bruckner and G. Dorr (Eds.), The State of Deep Coral Ecosystems of the United States. NOAA Technical Memorandum CRCP-3, Silver Spring, MD.

Brooks, J.M., C. Fisher, H. Roberts, E. Cordes, I. Baums, B. Bernard, R. Church, P. Etnoyer, C. German, E. Goehring, I. McDonald, H. Roberts, T. Shank, D. Warren, S. Welsh, and G. Wolff. 2012. Exploration and Research of Northern Gulf of Mexico Deepwater Natural and Artificial Hard-bottom Habitats with Emphasis on Coral Communities: Reefs, Rigs, and Wrecks — “Lophelia II” Interim Report. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study BOEM 2012-106. 126 pp.

Bruintjes, R. and A.N. Radford. 2013. Context-dependent impacts of anthropogenic noise on individual and social behaviour in a cooperatively breeding fish. Animal Behaviour 85(6): 1343-1349.

Bureau of Ocean Energy Management. 2012a. Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017. Western Planning Area Lease Sales 229, 233, 238, 246, and 248. Central Planning Area Lease Sales 227, 231, 235, 241, and 247. Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2012-019. 3 volumes.

Bureau of Ocean Energy Management. 2012b. Gulf of Mexico OCS Oil and Gas Lease Sale: 2012. Central Planning Area Lease Sale 216/222. Final Supplemental Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2012-058. 2 volumes.

Bureau of Ocean Energy Management. 2013. Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014. Western Planning Are Lease Sale 233. Central Planning Area 231. Final Supplemental Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2013-0118. 526 pp.

Bureau of Ocean Energy Management. 2014. Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017. Central Planning Area Lease Sales 235, 241, and 247. Final Supplemental Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2014-655.

Bureau of Ocean Energy Management. 2015. Gulf of Mexico OCS Oil and Gas Lease Sales: 2016 and 2017. Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226. Final Supplemental Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2015-033. 748 pp.

Bureau of Ocean Energy Management. 2016a. Outer Continental Shelf Oil and Gas Leasing Program: 2017-2022. Final Programmatic Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EIA BOEM 2016-060.

Bureau of Ocean Energy Management. 2016b. Gulf of Mexico OCS Oil and Gas Lease Sale: 2016. Western Planning Area Lease Sale 248. Final Supplemental Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2016-005.

Bureau of Ocean Energy Management. 2016c. Essential Fish Habitat Assessment for the Gulf of Mexico. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS Report BOEM 2016-016. 62 pp.

Bureau of Ocean Energy Management. 2017a. Gulf of Mexico OCS Oil and Gas Lease Sales: 2017-2022. Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261. Final Multisale Environmental Impact Statement. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS EIS/EA BOEM 2017-009. 3 volumes.

Bureau of Ocean Energy Management. 2017b. Catastrophic Spill Event Analysis: High-Volume, Extended Duration Oil Spill Resulting from Loss of Well Control on the Gulf of Mexico Outer Continental Shelf. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS Report BOEM 2017-007. 355 pp.

Bureau of Safety and Environmental Enforcement. 2018. Offshore Incident Statistics. U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement. https://www.bsee.gov/stats-facts/offshore-incident-statistics

Cada, G. 1990. A review of studies relating to the effects of propeller-type turbine passage on fish early life stages. North American Journal of Fisheries Management 10(4): 418-426.

Camhi, M.D., E.K. Pikitch, and E.A. Babcock (Eds.) 2008. Sharks of the Open Ocean: Biology, Fisheries, and Conservation. Blackwell Publishing Ltd. Oxford, UK.

Carlson, J.K., J. Osborne, and T.W. Schmidt. 2007. Monitoring of the recovery of smalltooth sawfish, *Pristis pectinata*, using standardized relative indices of abundance. Biological Conservation 136: 195-202.

Carlson, J.K. and J. Osborne. 2012. Relative abundance of smalltooth sawfish (*Pristis pectinata*) based on Everglades National Park Creel Survey. NOAA Technical Memorandum NMFS-SEFSC-626. 15 pp.

Carr, A. 1996. Suwanee River sturgeon, pp. 73-83. In: M.H. Carr, A Naturalist in Florida. Yale University Press, New Haven, CT.

Carvalho, R., C.-L. Wei, G.T. Rowe, and A. Schulze. 2013. Complex depth-related patterns in taxonomic and functional diversity of polychaetes in the Gulf of Mexico. Deep Sea Research Part I: Oceanographic Research Papers80: 66-77.

Casper, B.M., P.S. Lobel, and H.Y. Yan. 2003. The hearing sensitivity of the little skate, *Raja erinacea*: a comparison of two methods. Environmental Biology of Fishes 68: 371-379.

Casper, B.M. and D.A. Mann. 2006. Evoked potential audiograms of the nurse shark (*Ginglymostoma cirratum*) and the yellow stingray (*Urobatis jamaicensis*). Environmental Biology of Fishes 76: 101-108.

Cave, E.J. and S.M. Kajiura. 2018. Effect of *Deepwater Horizon* crude oil water accomodated fraction on olfactory function in the Atlantic stingray, *Hypanus sabinus*. Scientific Reports 8:15786.

Clapp, R.B., R.C. Banks, D. Morgan-Jacobs, and W.A. Hoffman. 1982a. Marine Birds of the Southeastern United States and Gulf of Mexico. Part I. Gaviiformes through Pelicaniformes. U.S. Fish and Wildlife Service, Office of Biological Services. Washington, DC. . FWS/OBS-82/01.

Clapp, R.B., D. Morgan-Jacobs, and R.C. Banks. 1982b. Marine Birds of the Southeastern United States and Gulf of Mexico. Part II. Anseriformes. U.S. Fish and Wildlife Service, Office of Biological Services. Washington DC. FWS/OBS 82/20.

Clapp, R.B., D. Morgan-Jacobs, and R.C. Banks. 1983. Marine Birds of the Southeastern United States and Gulf of Mexico. Part III. Charadriiformes. U.S. Fish and Wildlife Service, Office of Biological Services. Washington, DC. FWS/OBS-83/30.

Colman, L.P., P.H. Lara, J. Bennie, A.C. Broderick, J.R. de Freitas, A. Marcondes, M.J. Witt, and B.J. Godley. 2020. Assessing coastal artificial light and potential exposure of wildlife at a national scale: the case of marine turtles in Brazil. Biodiversity and Conservation 29: 1135-1152.

Conn, P.B., and G.K. Silber. 2013. Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales. Ecosphere 4(4): 1–16.

Continental Shelf Associates, Inc,. 1997. Characterization and Trends of Recreational and Commercial Fishing from the Florida Panhandle. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. USGS/BRD/CR 1997 0001 and OCS Study MMS 97-0020.

Continental Shelf Associates, Inc. 2002. Deepwater Program: Bluewater fishing and OCS Activity, Interactions Between the Fishing and Petroleum Industries in Deepwaters of the Gulf of Mexico. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2002-078. 193 pp. + apps.

Cruz-Kaegi, M.E. 1998. Latitudinal Variations in Biomass and Metabolism of Benthic Infaunal Communities. Ph.D. Dissertation, Texas A&M University, College Station, TX. .

CSA International, Inc. 2007. Characterization of Northern Gulf of Mexico Deepwater Hard-bottom Communities with Emphasis on *Lophelia* Coral. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2007-044.

Daling, P.S., F. Leirvik, I.K. Almås, P.J. Brandvik, B.H. Hansen, A. Lewis, and M. Reed. 2014. Surface weathering and dispersability of MC252 crude oil. Marine Pollution Bulletin 15(87): 1-2.

Davis, R.W. and G.S. Fargion (Eds.). 1996. Distribution and Abundance of Cetaceans in the North-central and Western Gulf of Mexico: Technical report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 96-0026.

Davis, R.W., W.E. Evans, and B. Würsig. 2000. Cetaceans, Sea Turtles, and Seabirds in the Northern Gulf of Mexico: Distribution, Abundance and Habitat Associations. Volume II: Technical Report. U.S. Geological Survey, Biological Resources Division, USGS/BRD/CR 1999-0006 and U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2000-003.

De Guise, S., M. Levin, E. Gebhard, L. Jasperse, L. Burdett Hart, C.R. Smith, S. Venn-Watson, R. Townsend, R. Wells, B. Balmer, E. Zolman, T. Rowles, and L. Schwacke. 2017. Changes in immune functions in bottlenose dolphins in the northern Gulf of Mexico associated with the *Deepwater Horizon* oil spill. Endangered Species Research 33: 291-303.

Ditty, J.G. 1986. Ichthyoplankton in neritic waters of the northern Gulf of Mexico off Louisiana: Composition, relative abundance, and seasonality. Fishery Bulletin 84(4): 935-946.

Ditty, J.G., G.G. Zieske, and R.F. Shaw. 1988. Seasonality and depth distribution of larval fishes in the northern Gulf of Mexico above 26°00'N. Fishery Bulletin 86(4): 811-823.

Dow Piniak, W.E., S.A. Eckert, C.A. Harms, E.M. Stringer. 2012a. Underwater Hearing Sensitivity of the Leatherback Sea Turtle (*Dermochelys coriacea*): Assessing the Potential Effect of Anthropogenic Noise. Headquarters, Herndon, VA: U.S. Department of the Interior, ureau of Ocean Energy Management. OCS Study BOEM 2012-01156. 35 pp.

Dow Piniak, W.E., D.A.Mann, S.A. Eckert, C.A. Harms. 2012b. Amphibious hearing in sea turtles. In: A.N. Popper, A. Hawkins (Eds.), The Effects of Noise on Aquatic Life. Advances in Experimental Medicine and Biology. New York, NY: Springer. pp. 83-87.

Edwards, R.E. and K.J. Sulak. 2006. New paradigms for yellowfin tuna movements and distributions - implications for the Gulf and Caribbean region. Proceedings of the Gulf and Caribbean Fisheries Research Institute 57: 283-296.

Efromyson, R.A., J.P. Nicolette, and G.W. Sutter II. 2003. A Framework for Net Environmental Benefit Analysis for Remediation or Restoration of Petroleum-contaminated Sites. ORNL/TM- 2003/17.

Efroymson, R.A., W.H. Rose, S. Nemeth, and G.W. Sutter II. 2000. Ecological Risk Assessment Framework for Low Altitude Overflights by Fixed-wing and Rotary-wing Military Aircraft. Oak Ridge National Laboratory. Oak Ridge, TN. ORNL/TM-2000/289 ES-5048. 116 pp.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. Birds in Jeopardy: The Imperiled and Extinct Birds of the United States and Canada, including Hawaii and Puerto Rico. Palo Alto, CA, Stanford University Press. 259 pp.

Electric Power Research Institute. 2000. Technical Evaluation of the Utility of Intake Approach Velocity as an Indicator of Potential Adverse Environmental Impact under Clean Water Act Section 316(b). Technical Report 1000731.

Ellison, W.T., B.L. Southall, C.W. Clark, and A.S. Frankel. 2012. A new context-based approach to assess marine mammal behavioral responses to anthropogenic sounds. Conservation Biology, 26(1): 21-28.

Fertl, D., A.J. Schiro, G.T. Regan, C.A. Beck, and N. Adimey. 2005. Manatee occurence in the northern Gulf of Mexico, west of Florida. Gulf and Caribbean Research 17(1): 69-94.

Florida Fish and Wildlife Conservation Commission. nd. Florida Salt Marsh Vole, *Microtus pennsylvanicus dekecampbelli*. https://myfwc.com/wildlifehabitats/profiles/mammals/land/florida-salt-marsh-vole/

Florida Fish and Wildlife Conservation Commission. 2018. Florida's Endangered and Threatened Species. https://myfwc.com/media/1945/threatend-endangered-species.pdf

Florida Fish and Wildlife Conservation Commission. nd-a. Loggerhead Nesting in Florida. http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead/

Florida Fish and Wildlife Conservation Commission. nd-b. Green Turtle Nesting in Florida. http://myfwc.com/research/wildlife/sea-turtles/nesting/green-turtle/

Florida Fish and Wildlife Conservation Commission. nd-c. Leatherback Nesting in Florida. http://myfwc.com/research/wildlife/sea-turtles/nesting/leatherback/

Florida Fish and Wildlife Conservation Commission. nd-d. Listed Invertebrates. http://myfwc.com/wildlifehabitats/imperiled/profiles/invertebrates/

Flower Garden Banks National Marine Sanctuary. 2018. Manta Catalog. https://flowergarden.noaa.gov/science/mantacatalog.html

Foley, K.A., C. Caldow, and E.L. Hickerson. 2007. First confirmed record of Nassau Grouper *Epinephelus striatus* (Pisces: Serranidae) in the Flower Garden Banks National Marine Sanctuary. Gulf of Mexico Science 25(2): 162-165.

Fox, D.A., J.E. Hightower, and F.M. Parauka. 2000. Gulf sturgeon spawning migration and habitat in the Choctawhatchee River System, Alabama–Florida. Transactions of the American Fisheries Society 129(3): 811-826.

Fritts, T.H. and R.P. Reynolds. 1981. Pilot Study of the Marine Mammals, Birds, and Turtles in OCS Areas of the Gulf of Mexico. U.S. Department of the Interior, Fish and Wildlife Service, Biological Services Program. FWS/OBS 81/36. 150 pp.

Fuller, A.R., G.J. McChesney, and R.T. Golightly. 2018. Aircraft disturbance to Common Murres (*Uria aalge*) at a breeding colony in central California, USA. Waterbirds 41(3): 257-267.

Gallaway, B.J. and G.S. Lewbel. 1982. The Ecology of Petroleum Platforms in the Northwestern Gulf of Mexico: a Community Profile. U.S. Fish and Wildlife Service, Biological Services Program and U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. FWS/OBS-82/27 and USGS Open File Report 82-03.

Gallaway, B.J., J.G. Cole, and R.G. Fechhelm. 2003. Selected Aspects of the Ecology of the Continental Slope Fauna of the Gulf of Mexico: A Synopsis of the Northern Gulf of Mexico Continental Slope Study, 1983-1988. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2003-072. 44 pp.

Gallaway, B.J., (ed.). 1988. Northern Gulf of Mexico Continental Slope Study, Final report: Year 4. Volume II: Synthesis report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 88-0053.

Gates, A.R., M.C. Benfield, D.J. Booth, A.M. Fowler, D. Skropeta, and D.O.B. Jones. 2017. Deep-sea observations at hydrocarbon drilling locations: Contributions from the SERPENT Project after 120 field visits. Deep-Sea Research Part II: Topical Studies in Oceanography 137:463-479.

Geraci, J.R. and D.J. St. Aubin. 1990. Sea Mammals and Oil: Confronting the Risks. Academic Press, San Diego, CA. 282 pp.

Gibson, D., D.H. Catlin, K.L. Hunt, J.D. Fraser, S.M. Karpanty, M.J. Friedrich, M.K. Bimbi, J.B. Cohen, and S.B. Maddock. 2017. Evaluating the impact of man-made distasters on imperiled species: Piping plovers and the *Deepwater Horizon* oil spill. Biological Conservation 2012: 48-62.

Gitschlag, G., B. Herczeg, and T. Barcack. 1997. Observations of sea turtles and other marine life at the explosive removal of offshore oil and gas structures in the Gulf of Mexico. Gulf Research Reports 9(4): 247-262.

Gomez, C., J.W. Lawson, A.J. Wright, A.D. Buren, D. Tollit, and V. Lesage. 2016. A systematic review on the behavioural responses of wild marine mammals to noise: the disparity between science and policy. Canadian Journal of Zoology 94: 801-819.

Gulf of Mexico Fishery Management Council. 2005. Generic Amendment Number 3 for addressing Essential Fish Habitat Requirements, Habitat Areas of Particular Concern, and adverse effects of fishing in the following Fishery Management Plans of the Gulf of Mexico: Shrimp fishery of the Gulf of Mexico, United States waters red drum fishery of the Gulf of Mexico, reef fish fishery of the Gulf of Mexico coastal migratory pelagic resources (mackerels) in the Gulf of Mexico and South Atlantic, stone crab fishery of the Gulf of Mexico, spiny lobster in the Gulf of Mexico and South Atlantic, coral and coral reefs of the Gulf of Mexico. Tampa, FL. Gulf of Mexico Fishery Management Council. 104 pp. https://gulfcouncil.org/wp-content/uploads/March-2005-FINAL3-EFH-Amendment.pdf

Haney, C.J., H.J. Geiger, and J.W. Short. 2014. Bird mortality from the *Deepwater Horizon* oil spill. Exposure probability in the Gulf of Mexico. Marine Ecology Progress Series 513: 225-237.

Hannam, M.L., S.D. Bamber, A.J. Moody, T.S. Galloway, and M.B. Jones. 2010. Immunotoxicity and oxidative stress in the Arctic scallop *Chlamys islandica*: Effects of acute oil exposure. Ecotoxicology and Environmental Safety 73: 1440-1448.

Harvell, C.D., K. Kim, J.M. Burkholder, R.R. Colwell, P.R. Epstein, D.J. Grimes, E.E. Hoffmann, E.K. Lipp, A.D.M.E. Osterhaus, R.M. Overstreet, J.W. Porter, G.W. Smith, and G.R. Vasta. 1999. Emerging marine diseases: climate links and anthropogenic factors. Science 285(5433): 1505-1510.

Hawkins, A.D. and A.N. Popper. 2014. Assessing the impact of underwwater sounds on fishes and other forms of marine life. Acoustics Today. Spring 2014**:** 30-41.

Hayes, S.A., E. Josephson, K. Maze-Foley, P.E. Rosel, B. Byrd, S. Chavez-Rosales, L.P. Garrison, J. Hatch, A. Henry, S.C. Horstman, J. Litz, M.C. Lyssikatos, K.D. Mullin, C. Orphanides, R.M. Pace, D.L. Palka, J. Powell, and F.W. Wenzel. 2019. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2018. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-NE-258.

Hayes, S.A., E. Josephson, K. Maze-Foley, P.E. Rosel, B. Byrd, S. Chavez-Rosales, T.V.N. Cole, L.P. Garrison, J. Hatch, A. Henry, S.C. Horstman, J. Litz, M.C. Lyssikatos, K.D. Mullin, C. Orphanides, R.M. Pace, D.L. Palka, J. Powell, and F.W. Wenzel. 2020. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2019. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. NOAA Technical Memorandum NMFS-NE-264. 479 pp.

Hazel, J., I. R. Lawler, H. Marsh, and S. Robson. 2007. Vessel speed increases collision risk for the green turtle *Chelonia mydas*. Endangered Species Research 3:105-113.

Higashi, G.R. 1994. Ten years of fish aggregating device (FAD) design development in Hawaii. Bulletin of Marine Science 55(2-3): 651-666.

Hildebrand, J.A. 2005. Impacts of anthropogenic sound, pp 101-124. In: J.E. Reynolds III, W.F. Perrin, R.R. Reeves, S. Montgomery and T.J. Ragen (Eds.), Marine Mammal Research: Conservation Beyond Crisis. Johns Hopkins University Press, Baltimore, MD.

Hildebrand, J.A. 2009. Anthropogenic and natural sources of ambient noise in the ocean. Marine Ecology Progress Series 395: 5-20.

Hildebrand, J.A., S. Baumann-Pickering, K.E. Frasier, J.S. Trickey, K.P. Merkens, S.M. Wiggins, M.A. McDonald, L.P. Garrison, D. Harris, T.A. Marques, and L. Thomas. 2015. Passive acoustic monitoring of beaked whale densities in the Gulf of Mexico. Scientific Reports 5: 16343.

Holland, K.N. 1990. Horizontal and vertical movements of yellowfin and bigeye tuna associated with fish aggregating devices. Fishery Bulletin 88: 493-507.

Intergovernmental Panel on Climate Change. 2014. Climate Change 2014: Impacts, Adaptation and Vulnerability. http://www.ipcc.ch/report/ar5/wg2/.

International Tanker Owners Pollution Federation Limited. 2018. Weathering. [https://www.itopf.org/knowledge-resources/documents-guides/fate-of-oil-spills/weathering/.](https://www.itopf.org/knowledge-resources/documents-guides/fate-of-oil-spills/weathering/)

Jensen, A.S. and G.K. Silber. 2004. Large Whale Ship Strike Database. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources, Silver Spring, Maryland. NOAA Technical Memorandum NMFS-OPR-25. 39 pp..

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.

Jochens, A., D.C. Biggs, D. Benoit-Bird, D. Engelhaupt, J. Gordon, C. Hu, N. Jaquet, M. Johnson, R.R. Leben, B. Mate, P. Miller, J.G. Ortega-Ortiz, A. Thode, P. Tyack, and B. Würsig. 2008. Sperm Whale Seismic Study in the Gulf of Mexico: Synthesis Report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2008-006. 341 pp.

Johnsgard, P.A. 1990. Hawks, Eagles, and Falcons of North America; Biology and Natural History. Washington, D.C., Smithsonian Institution Press. 456 pp.

Keithly, W.R. and K.J. Roberts. 2017. Commercial and recreational fisheries of the Gulf of Mexico., pp. 1039-1188. In: C.H. Ward (Ed.), Habitats and Biota of the Gulf of Mexico: Before the Deepwater Horizon Oil Spill. Volume 2: Fish Resources, Fisheries, Sea Turtles, Avian Resources, Marine Mammals, Diseases and Mortalities. Springer, New York, NY.

Kennicutt, M.C. 2000. Chemical oceanography, pp. 123-139. In: Continental Shelf Associates, Inc., Deepwater Program: Gulf of Mexico deepwater Information Resources Data Search and Literature Synthesis. Volume I: Narrative Report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2000-049. 340 pp.

Ketten, D.R. and S.M. Bartol. 2005. Functional Measures of Sea Turtle Hearing, Woods Hole Oceanographic Institution, Woods Hole, MA. ONR Award No: N00014-02-0510.

Kyhn, L.A., S. Sveegaard, and J. Tougaard. 2014. Underwater noise emissions from a drillship in the Arctic. Marine Pollution Bulletin 86: 424-433.

Ladich, F. and R.R. Fay. 2013. Auditory evoked potential audiometry in fish. Reviews in Fish Biology and Fisheries 23(3): 317-364.

Laist, D.W., A R. Knowlton, J.G. Mead, A.S. Collet, and M. Podesta. 2001. Collisions between ships and whales. Marine Mammal Science 17(1):35-75.

Lee, W.Y., K. Winters, and J.A.C. Nicol. 1978. The biological effects of the water soluble fractions of a No. 2 fuel oil on the planktonic shrimp, *Lucifer faxoni*. Environmental Pollution 15: 167-183.

Lee, R.F., M. Koster, and G.A. Paffenhofer. 2012. Ingestion and defecation of dispersed oil droplets by pelagic tunicates. Journal of Plankton Research 34: 1058-1063.

Lee, R.F. 2013. Ingestion and Effects of Dispersed Oil on Marine Zooplankton. Prepared for Prince William Sound Regional Citizens' Advisory Council (PWSRCAC), Anchorage, Alaska. 21 pp.

Lennuk, L., J. Kotta, K. Taits, and K. Teeveer. 2015. The short-term effects of crude oil on the survival of different size-classes of cladoceran *Daphnia magna* (Straus, 1820). Oceanologia 57(1): 71-77.

Linden, O. 1976. Effects of oil on the reproduction of the amphipod *Gammarus oceanicus*. Ambio 5: 36-37.

Lohoefener, R., W. Hoggard, K.D. Mullin, C. Roden, and C. Rogers. 1990. Association of Sea Turtles with Petroleum Platforms in the North Central Gulf of Mexico. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 90-0025. 90 pp.

Lutcavage, M.E., P.L. Lutz, G.D. Bossart, and D.M. Hudson. 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. Archives of Environmental Contamination and Toxicology 28(4): 417-422.

Lutcavage, M.E., P. Plotkin, B. Witherington, and P.L. Lutz. 1997. Human impacts on sea turtle survival, pp. 387-409. In: P.L. Lutz and J.A. Musick (Eds.), The Biology of Sea Turtles. CRC Press, Boca Raton, FL.

MacDonald, I.R. 2002. Stability and Change in Gulf of Mexico Chemosynthetic Communities. Volume II: Technical Report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2002-036. 456 pp.

Main, C.E., H.A. Ruhl, D.O.B. Jones, A. Yool, B. Thornton, and D.J. Mayor. 2015. Hydrocarbon contamination affects deep-sea benthic oxygen uptake and microbial community composition. Deep Sea Research. Part I: Oceanographic Research Papers 100: 79-87.

Marine Mammal Commission. 2011. Assessing the long-term effects of the BP *Deepwater Horizon* oil spill on marine mammals in the Gulf of Mexico: A statement of research needs. http://www.mmc.gov/wp-content/uploads/longterm_effects_bp_oilspil.pdf

Marshall, A., M.B. Bennett, G. Kodja, S. Hinojosa-Alvarez, F. Galvan-Magana, M. Harding, G. Stevens, and T. Kashiwagi. 2018. *Mobula birostris* (amended version of 2011 assessment). The IUCN Red List of Threatened Species. http://www.iucnredlist.org/details/198921/0

Martin KJ, Alessi SC, Gaspard JC, Tucker AD, Bauer GB, Mann DA. 2012. Underwater hearing in the loggerhead turtle (*Caretta caretta*): A comparison of behavioral and auditory evoked potential audiograms. Journal of Experiment Biology 215(17):3001-3009.

Mayhew, D.A., L.D. Jensen, D.F. Hanson, and P.H. Muessig. 2000. A comparative review of entrainment survival studies at power plants in estuarine environments, pp. S295–S302. In: J. Wisniewski (Ed.), Environmental Science & Policy; Power Plants & Aquatic Resources: Issues and Assessment, Vol. 3, Supplement 1. Elsevier Science Ltd., New York, New York.

McCauley R.D, Fewtrell J, Duncan AJ, Jenner C, Jenner M.N, Penrose JD, Prince R.I.T, Adhitya A, Murdoch J, McCabe K. 2000. Marine seismic surveys—a study of environmental implications. APPEA Journal 40(1):692-708.

McDonald, T.L., F.E. Hornsby, T.R. Speakman, E.S. Zolman, K.D. Mullin, C. Sinclair, P.E. Rosel, L. Thomas, and L.H. Schwacke. 2017. Survival, density, and abundance of common bottlenose dolphins in Barataria Bay (USA) following the *Deepwater Horizon* oil spill. Endangered Species Research 33: 193-209.

McKenna, M.F., D. Ross, S.M. Wiggins, and J.A. Hildebrand. 2012. Underwater radiated noise from modern commercial ships. Journal of the Acoustical Society of America 131: 92-103.

McLaughlin, K.E. and H.P. Kunc. 2015. Changes in the acoustic environment alter the foraging and sheltering behaviour of the cichlid *Amititlania nigrofasciata*. Behavioural processes 116: 75-79.

Mendel, B., P. Schwemmer, V. Peschko, S. Muller, H. Schwemmer, M. Mercker, and S. Garthe. 2019. Operational offshore wind farms and associated ship traffic cause profound changes in distribution patterns of Loons (*Gavia* spp.). Journal of Environmental Management 231: 429-438.

Mendelssohn, I.A., M.R. Byrnes, R.T. Kneib, and B.A. Vittor. 2017. Coastal Habitats of the Gulf of Mexico, pp. 359-640. In: C.H. Ward (Ed.), Habitats and Biota of the Gulf of Mexico: Before the Deepwater Horizon Oil Spill. Springer, New York, NY.

Mississippi Natural Heritage Program. 2018. Natural Heritage Program Online Database. Museum of Natural Science, Mississippi Department of Wildlife, Fisheries, and Parks. https://www.mdwfp.com/museum/seek-study/heritage-program/nhp-online-data/

Møhl, B., M. Wahlberg, and P.T. Madsen. 2003. The monopulsed nature of sperm whale clicks. Journal of the Acoustical Society of America 114(2): 1143-1154.

Moore, S.F. and R.L. Dwyer. 1974. Effects of oil on marine organisms: a critical assessment of published data. Water Research 8: 819-827.

Morrow, J.V.J., J.P. Kirk, K.J. Killgore, H. Rugillio, and C. Knight. 1998. Status and recovery of Gulf sturgeon in the Pearl River system, Louisiana-Mississippi. North American Journal of Fisheries Management 18: 798-808.

Mullin, K.D., W. Hoggard, C. Roden, R. Lohoefener, C. Rogers, and B. Taggart. 1991. Cetaceans on the Upper Continental Slope in the North-central Gulf of Mexico. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 91-0027. 118 pp.

Mullin, K.D. 2007. Abundance of Cetaceans in the Oceanic Gulf of Mexico Based on 2003-2004 Ship Surveys. U.S. Department of Commerce, National Marine Fisheries Service, Southeast Fisheries Science Center. Pascagoula, MS.

National Marine Fisheries Service. 2007. Endangered Species Act, Section 7 Consultation – Biological Opinion. Gulf of Mexico Oil and Gas Activities: Five Year Leasing Plan for Western and Central Planning Areas 2007-2012. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. St. Petersburg, FL. http://www.nmfs.noaa.gov/ocs/mafac/meetings/2010_06/docs/mms_02611_leases_2007_2012.pdf

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 2008. Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (*Caretta caretta*), Second Revision. https://www.fisheries.noaa.gov/action/recovery-plans-loggerhead-sea-turtle

National Marine Fisheries Service. 2009a. Sperm Whale (*Physeter macrocephalus*) 5-Year Review: Summary and Evaluation. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division. Silver Spring, MD. 61 pp.

National Marine Fisheries Service. 2009b. Smalltooth Sawfish Recovery Plan (*Pristis pectinata*). Prepared by the Smalltooth Sawfish Recovery Team for the National Marine Fisheries Service, Silver Spring, MD. 102 pp. https://repository.library.noaa.gov/view/noaa/15983

National Marine Fisheries Service. 2009c. Final Amendment 1 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan Essential Fish Habitat. Highly Migratory Species Management Division, Office of Sustainable Fisheries. Silver Spring, MD. http://pbadupws.nrc.gov/docs/ML1219/ML12195A241.pdf

National Marine Fisheries Service. 2010. Final Recovery Plan for the Sperm Whale (*Physeter macrocephalus*). Silver Spring, MD. https://www.fisheries.noaa.gov/resource/document/recovery-plan-sperm-whale-physeter-macrocephalus

National Marine Fisheries Service, U.S. Fish and Wildlife Service and Secretaría de Medio Ambiente y Recursos Naturales. 2011. Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), Second Revision. http://www.nmfs.noaa.gov/pr/pdfs/recovery/kempsridley_revision2.pdf

National Marine Fisheries Service. 2011. Species of concern: Western Atlantic bluefin tuna, *Thunnus thynnus*. http://www.nmfs.noaa.gov/pr/pdfs/species/bluefintuna_detailed.pdf

National Marine Fisheries Service. 2014a. Critical Habitat for Loggerhead Sea Turtle. https://www.fisheries.noaa.gov/action/critical-habitat-loggerhead-sea-turtle

National Marine Fisheries Service. 2014b. Gulf Sturgeon (*Acipenser oxyrinchus desotoi*). https://www.fisheries.noaa.gov/species/gulf-sturgeon

National Marine Fisheries Service. 2015. Recovery Plan for Elkhorn Coral (*Acropora palmata*) and Staghorn Coral (*A. cervicornis*). Protected Resources Division. Southeast Regional Office. Saint Petersburg, FL. https://data.nodc.noaa.gov/coris/library/NOAA/CRCP/project/2160/final_acropora_recovery_plan.pdf
National Marine Fisheries Service. 2016. Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. NOAA Technical Memorandum NMFS-OPR-55. 189 pp.
National Marine Fisheries Service. 2018a. Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources, Silver Spring, MD. NOAA Technical Memorandum NMFS-OPR-59. 178 pp.
National Marine Fisheries Service. 2018b. Oceanic Whitetip Shark. https://www.fisheries.noaa.gov/species/oceanic-whitetip-shark
National Marine Fisheries Service. 2018c. Smalltooth Sawfish (*Pristis pectinata*) 5-Year Review: Summary and Evaluation of United States Distinct Population Segment of Smalltooth Sawfish. Southeast Regional Office, St. Petersburg, Florida. 63 pp. https://repository.library.noaa.gov/view/noaa/19253/Print
National Marine Fisheries Service. 2020a. Endangered Species Act, Section 7 Consultation – Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. St. Petersburg, FL. https://www.fisheries.noaa.gov/resource/document/biological-opinion-federally-regulated-oil-and-gas-program-activities-gulf-mexico
National Marine Fisheries Service. 2020b. Sea turtles, dolphins, and whales - 10 years after the *Deepwater Horizon* oil spill. https://www.fisheries.noaa.gov/national/marine-life-distress/sea-turtles-dolphins-and-whales-10-years-after-deepwater-horizon-oil.
National Oceanic and Atmospheric Administration. 2006. Fact Sheet: Small Diesel Spills (500-5,000 gallons). NOAA Scientific Support Team, Hazardous Materials Response and Assessment Division. Seattle, WA. 2 pp.
National Oceanic and Atmospheric Administration. 2010. Oil and Sea Turtles. Biology, Planning, and Response. U.S. Department of Commerce, National Ocean Service, Office of Response and Restoration. 111 pp. http://response.restoration.noaa.gov/sites/default/files/Oil_Sea_Turtles.pdf
National Oceanic and Atmospheric Administration. 2014. Flower Garden Banks National Marine Sanctuary. http://flowergarden.noaa.gov/about/cnidarianlist.html
National Oceanic and Atmospheric Administration. 2016a. ADIOS 2 (Automated Data Inquiry for Oil Spills). http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/downloading-installing-and-running-adios.html
National Oceanic and Atmospheric Administration. 2016b. *Deepwater Horizon* Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement. http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/
National Oceanic and Atmospheric Administration. 2017. Small Diesel Spills (500 - 5,000 gallons). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Response and Restoration. https://response.restoration.noaa.gov/sites/default/files/Small-Diesel-Spills.pdf
National Oceanic and Atmospheric Administration. 2018. Giant Manta Ray. https://www.fisheries.noaa.gov/species/giant-manta-ray
National Oceanic and Atmospheric Administration. nd. Nassau Grouper. https://www.fisheries.noaa.gov/species/nassau-grouper
National Park Service. 2010. Breton Wilderness 300 km Radius. https://www.fws.gov/refuges/airquality/docs/Breton_WA300km.pdf
National Research Council. 1983. Drilling Discharges in the Marine Environment. Washington, DC. National Academy Press. 180 pp.
National Research Council. 2003a. Oil in the Sea III: Inputs, Fates, and Effects. Washington, DC. National Academy Press. 182 pp. + app.
National Research Council. 2003b. Ocean Noise and Marine Mammals. Washington, DC. National Academy Press. 204 pp.

National Wildlife Federation. 2016. Wildlife Library: Whooping Crane. http://www.nwf.org/wildlife/wildlife-library/birds/whooping-crane.aspx

NOAA Fisheries (National Marine Fisheries Service). nd. Smalltooth Sawfish. https://www.fisheries.noaa.gov/species/smalltooth-sawfish.

NOAA Fisheries. 2020. Species Directory – ESA Threatened and Endangered. https://www.fisheries.noaa.gov/species-directory/threatened-endangered.

Operational Science Advisory Team, 2011. Summary Report for Fate and Effects of Remnant Oil Remaining in the Beach Environment. Prepared for Lincoln D. Stroh, Capt., U.S. Coast Guard, Federal On-Scene Coordinator, *Deepwater Horizon* MC252.

Ozhan, K., M.L. Parsons, and S. Bargu. 2014. How were phytoplankton affected by the *Deepwater Horizon* oil spill? Bioscience 64: 829-836.

Pabody, C.M., R.H. Carmichael, L. Rice, and M. Ross. 2009. A new sighting network adds to 20 years of historical data on fringe West Indian Manatee (*Trichechus manatus*) populations in Alabama waters. Gulf of Mexico Science 1:52-61.

Picciulin, M., L. Sebastianutto, A. Codarin, A. Farina, and E.A. Ferrero. 2010. In situ behavioural responses to boat noise exposure of *Gobius cruentatus* (Gmelin, 1789; fam. Gobiidae) and *Chromis chromis* (Linnaeus, 1758; fam. Pomacentridae) living in a Marine Protected Area. Journal of Experimental Marine Biology and Ecology 386(1): 125-132.

Piniak WED, Mann DA, Harms CA, Jones TT, Eckert SA. 2016. Hearing in the juvenile green sea turtle (*Chelonia mydas*): A comparison of underwater and aerial hearing using auditory evoked potentials. PLoS One 11(10):e0159711.

Poot, H., B.J. Ens, H. de Vries, M.A. Donners, M.R. Wernand, and J.M. Marquenie. 2008. Green light for nocturnally migrating birds. Ecology and Society 13(2): 47.

Popper, A.N., A.D. Hawkins, R.R. Fay, D. Mann, S. Bartol, T.J. Carlson, S. Coombs, W.T. Ellison, R.L. Gentry, M.B. Halvorsen, S. Lokkeborg, P. Rogers, B.L. Southall, D. Zeddies, and W.N. Tavolga. 2014. Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report. ASA S3/SC1.4 TR-2014 prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. ASA Press, Springer.

Powers, S.P., F.J. Hernandez, R.H. Condon, J.M. Drymon, and C.M. Free. 2013. Novel pathways for injury from offshore oil spills: Direct, sublethal and indirect effects of the *Deepwater Horizon* oil spill on pelagic *Sargassum* communities. PLoS One 8(9): e74802.

Pritchard, P.C.H. 1997. Evolution, phylogeny, and current status, pp. 1-28. In: P.L. Lutz and J.A. Musick (Eds.), The Biology of Sea Turtles. CRC Press, Boca Raton, FL.

Radford, A.N., E. Kerridge, and S.D. Simpson. 2014. Acoustic communication in a noisy world: Can fish compete with anthropogenic noise? . Behavioral Ecology 25(5): 1,022-1,030.

Rathbun, G.B. 1988. Fixed-wing airplane versus helicopter surveys of manatees. Marine Mammal Science 4(1): 71-75.

Relini, M., L.R. Orsi, and G. Relini. 1994. An offshore buoy as a FAD in the Mediterranean. Bulletin of Marine Science 55(2-3): 1099-1105.

Reşitoğlu, İ.A., K. Altinişik, and A. Keskin. 2015. The pollutant emissions from diesel-engine vehicles and exhaust after treatment systems. Clean Technologies and Environmental Policy 17(1): 15-27.

Richards, W.J., T. Leming, M.F. McGowan, J.T. Lamkin, and S. Kelley-Farga. 1989. Distribution of fish larvae in relation to hydrographic features of the Loop Current boundary in the Gulf of Mexico. ICES Marine Science Symposia 191: 169-176.

Richards, W.J., M.F. McGowan, T. Leming, J.T. Lamkin, and S. Kelley-Farga. 1993. Larval fish assemblages at the Loop Current boundary in the Gulf of Mexico. Bulletin of Marine Science 53(2): 475-537.

Richardson, W.J., C.R. Greene Jr., C.I. Malme, and D.H. Thomson. 1995. Marine Mammals and Noise. San Diego, CA, Academic Press. 592 pp.

Rigby, C.L., R. Barreto, J. Carlson, D. Fernando, S. Fordham, M.P. Francis, K. Herman R.W. Jabado, K.M. Liu, A. Marshall, N. Pacoureau, E. Romanov, R.B. Sherley and H. Winker. 2019. *Carcharhinus longimanus*. The IUCN Red List of Threatened Species 2019: e.T39374A2911619.

Rodgers, J.A. and S.T. Schwikert. 2002. Buffer-Zone Distances to protect foraging and loafing waterbirds from disturbance by personal watercraft and outboard-powered boats. Conservation Biology 16(1): 216-224.

Rojek, N.A., M.W. Parker, H.R. Carter, and G.J. McChesney. 2007. Aircraft and vessel disturbances to Common Murres *Uria aalge* at breeding colonies in central California, 1997-1999. Marine Ornithology 35: 61-69.

Rosel, P.E., P. Corkeron, L. Engleby, D. Epperson, K.D. Mullin, M.S. Soldevilla, and B.L. Taylor. 2016. Status Review of Bryde's Whales (*Balaenoptera edeni*) in the Gulf of Mexico under the Endangered Species Act. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center. NOAA Technical Memorandum NMFS-SEFSC-692. 133 pp.

Ross, S.W., A.W.J. Demopoulos, C.A. Kellogg, C.L. Morrison, M.S. Nizinski, C.L. Ames, T.L. Casazza, D. Gualtieri, K. Kovacs, J.P. McClain, A.M. Quattrini, A.Y. Roa-Varón, and A.D. Thaler. 2012. Deepwater Program: Studies of Gulf of Mexico lower Continental Slope Communities Related to Chemosynthetic and Hard Substrate Habitats. U.S. Department of the Interior, U.S. Geological Survey. U.S. Geological Survey Open-File Report 2012-1032. 318 pp.

Rowe, G.T. and M.C. Kennicutt. 2009. Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study. Final Report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2009-039. 456 pp.

Rudd, M.B., R.N.M. Ahrens, W.E. Pine III, and S.K. Bolden. 2014. Empirical spatially explicit natural mortality and movement rate estimates for the threatened Gulf Sturgeon (*Acipenser oxyrinchus desotoi*). Canadian Journal of Fisheries and Aquatic Sciences 71: 1407-1417.

Russell, R.W. 2005. Interactions Between Migrating Birds and Offshore Oil and Gas Platforms in the Northern Gulf of Mexico: Final Report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2005-009. 348 pp.

Sadovy, Y. 1997. The case of the disappearing grouper; *Epinephelus striatus*, the Nassau grouper in the Caribbean and western Atlantic. Proceedings of the Gulf and Caribbean Fisheries Institute 45: 5-22.

Salmon, M. and J. Wyneken. 1990. Do swimming loggerhead sea turtles (*Caretta caretta L.*) use light cues for offshore orientation? Marine and Freshwater Behaviour and Physiology 17(4): 233-246.

Samuel, Y., S.J. Morreale, C.W. Clark, C.H. Greene, and M.E. Richmond. 2005. Underwater, low-frequency noise in a coastal sea turtle habitat. Journal of the Acoustical Society of America 117(3): 1465-1472.

Schwemmer, P., B. Mendel, N. Sonntag, V. Dierschke, and S. Garthe. 2011. Effects of ship traffic on seabirds in offshore waters: implications for marine conservation and spatial planning. Ecological Applications 21(5): 1851-1860.

Seitz, J.C. and G.R. Poulakis. 2006. Anthropogenic effects on the smalltooth sawfish (*Pristis pectinata*) in the United States. Marine Pollution Bulletin 52(11): 1533-1540.

Share the Beach. 2016. Nesting season statistics. http://www.alabamaseaturtles.com/nesting-season-statistics/

Simões, T.N., A. Candido de Silva, and C. Carneiro de Melo Moura. 2017. Influence of artificial lights on the orientation of hatchlings of *Eretmochelys imbricata* in Pernambuco, Brazil. Zoologia 34: e13727.

Smultea, M.A., J.R. Mobley Jr., D. Fertl, and G.L. Fulling. 2008. An unusual reaction and other observations of sperm whales near fixed wing aircraft. Gulf and Caribbean Research 20: 75-80.

Southall B.J., Bowles A.E., Ellison W.T., Finneran J.J., Gentry R.L., Greene Jr. C.R., Kastak D., Ketten D.R., Miller J.H., Nachtigall P.E., Richardson W.J., Thomas J.A., and Tyack P.L. 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals 33(44):411-521.

Southall, B.L., D.P. Nowacek, P.J. Miller, and P.L. Tyack. 2016. Experimental field studies to measure behavioral responses of cetaceans to sonar. Endangered Species Research 31: 293-315.

Spies, R.B., S. Senner and C.S. Robbins. 2016. An overview of the northern Gulf of Mexico ecosystem. Gulf of Mexico Science 33(1):98-121. doi: 10.18785/goms.3301.09.

Stewart, J.D., M. Nuttall, E.L. Hickerson, and M.A. Johnson. 2018. Important juvenile manta ray habitat at Flower Garden Banks National Marine Sanctuary in the northwestern Gulf of Mexico. Marine Biology 165(111).

Stiles, M.L., E. Harrould-Kolieb, R. Faure, H. Tlitalo-Ward, and M.F. Hirschfield. 2007. Deep Sea Trawl Fisheries of the Southeast U.S. and Gulf of Mexico: Rock Shrimp, Royal Red Shrimp, Calico Scallops. Oceana. Washington DC. 24 pp.

Suchanek, T.H. 1993. Oil impacts on marine invertebrate populations and communities. American Zoologist 33: 510-523.

Sulak, K.J. and J.P. Clugston. 1998. Early life history stages of Gulf sturgeon in the Suwanee River, Florida. Transactions of the American Fisheries Society 127: 758-771.

Taylor, B.L., R. Baird, J. Barlow, S.M. Dawson, J. Ford, J.G. Mead, G. Notarbartolo di Sciara, P. Wade, and R.L. Pitman. 2008. *Mesoplodon bidens*. The IUCN Red List of Threatened Species 2008: e.T13241A3424903.

Todd, V.L.G., W.D. Pearse, N.C. Tegenza, P.A. Lepper, and I.B. Todd. 2009. Diel echolocation activity of harbour porpoises (*Phocoena phocoena*) around North Sea offshore gas installations. ICES Journal of Marine Science 66: 734-745.

Turtle Island Restoration Network. 2020. Kemp's Ridley Sea Turtle Count on the Texas Coast. https://seaturtles.org/turtle-count-texas-coast/

Tuxbury, S.M. and M. Salmon. 2005. Competitive interactions between artificial lighting and natural cues during seafinding by hatchling marine turtles. Biological Conservation 121: 311-316.

U.S. Environmental Protection Agency. 2020. Nonattainment Areas for Criteria Pollutants (Green Book). https://www.epa.gov/green-book

U.S. Fish and Wildlife Service, Gulf States Marine Fisheries Commission and National Marine Fisheries Service. 1995. Gulf Sturgeon Recovery/Management Plan. U.S. Department of Interior, U.S. Fish and Wildlife Service, Southeast Region. Atlanta, GA.

U.S. Fish and Wildlife Service. 2001a. Florida manatee recovery plan (*Trichechus manatus latirostris*), Third Revision. U.S. Department of the Interior, Southeast Region. Atlanta, GA.

U.S. Fish and Wildlife Service. 2001b. Endangered and threatened wildlife and plants; Endangered status for the Florida salt marsh vole. *Federal Register* 56(9):1457-1459.

U.S. Fish and Wildlife Service. 2003. Recovery plan for the Great Lakes Piping Plover (*Charadrius melodus*). U.S. Department of the Interior. Fort Snelling, MN.

U.S. Fish and Wildlife Service. 2007. International Recovery Plan: Whooping Crane (*Grus americana*), Third Revision. U.S. Department of the Interior. Albequerque, NM.

U.S. Fish and Wildlife Service. 2010. Beach-nesting birds of the Gulf. http://www.fws.gov/home/dhoilspill/pdfs/DHBirdsOfTheGulf.pdf

U.S. Fish and Wildlife Service. 2011. FWS *Deepwater Horizon* Oil Spill Response. Bird Impact Data and Consolidated Wildlife Reports. *Deepwater Horizon* Bird Impact Data from the DOI-ERDC NRDA Database 12 May 2011. http://www.fws.gov/home/dhoilspill/pdfs/Bird%20Data%20Species%20Spreadsheet%2005122011.pdf

U.S. Fish and Wildlife Service. 2014. West Indian Manatee (*Trichechus manatus*) Florida Stock (Florida subspecies, *Trichechus manatus latirostris*). Jacksonville, Florida. https://www.fws.gov/northflorida/Manatee/SARS/20140123_FR00001606_Final_SAR_WIM_FL_Stock.pdf

U.S. Fish and Wildlife Service. 2015. Hawksbill Sea Turtle (*Eretmochelys imbricata*). http://www.fws.gov/northflorida/SeaTurtles/Turtle%20Factsheets/hawksbill-sea-turtle.htm

U.S. Fish and Wildlife Service. 2016. Find Endangered Species. http://www.fws.gov/endangered/

U.S. Fish and Wildlife Service. nd. All About Piping Plovers. http://www.fws.gov/plover/facts.html

U.S. Fish and Wildlife Service. 2020a. Endangered Species – U.S. Species. www.fws.gov/endangered/species/us-species.html.

U.S. Fish and Wildlife Service. 2020b. Whooping Crane Survey Results: Winter 2019-2020. https://www.fws.gov/uploadedFiles/WHCR%20Update%20Winter%202019-2020b.pdf.

Urick, R.J. 1983. Principles of underwater sound. Los Altos Hills, CA, Peninsula Publishing. 444 pp.

Vanderlaan, A. S. and C. T. Taggart. 2007. Vessel collisions with whales: The probability of lethal injury based on vessel speed. Marine Mammal Science 23(1):144-156.

Van de Laar, F.J.T. 2007. Green Light to Birds: Investigations into the Effect of Bird Friendly Lighting. NAM LOCATIE L15-FA-1. 23 pp. https://tethys.pnnl.gov/sites/default/files/publications/van-de-Laar-2007.pdf

Wakeford, A. 2001. State of Florida Conservation Plan for Gulf sturgeon (*Acipencer oxyrinchus desotoi*). Florida Fish and Wildlife Conservation Commission, St. Petersburg, FL. FMRI Technical Report TR-8. 106 pp.

Waring, G.T., E. Josephson, K. Maze-Foley, and P.E.E. Rosel. 2016. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2015. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. NOAA Technical Memorandum NMFS NE 238. 361 pp.

Wartzok, D. and D.R. Ketten. 1999. Marine mammal sensory systems, pp 117-175. In: J.E. Reynolds III and S. Rommel (Eds.), Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Wei, C.-L. 2006. The Bathymetric Zonation and Community Structure of Deep-sea Macrobenthos in the Northern Gulf of Mexico. M.S. Thesis, Texas A&M University.

Wei, C.-L., G.T. Rowe, G.F. Hubbard, A.H. Scheltema, G.D.F. Wilson, I. Petrescu, J.M. Foster, M.K. Wickstein, M. Chen, R. Davenport, Y. Soliman, and Y. Wang. 2010. Bathymetric zonation of deep-sea macrofauna in relation to export of surface phytoplankton production. Marine Ecology Progress Series 39: 1-14.

Wiese, F.K., W.A. Montevecchi, G.K. Davoren, F. Huettmann, A.W. Diamond, and J. Linke. 2001. Seabirds at risk around offshore oil platforms in the north-west Atlantic. Marine Pollution Bulletin 42(12): 1285-1290.

Wilson, C.A., A. Pierce, and M.W. Miller. 2003. Rigs and Reefs: A Comparison of the Fish Communities at Two Artificial Reefs, a Production Platform, and a Natural Reef in the Northern Gulf of Mexico. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2003-009. 105 pp.

Wilson, C.A., M.W. Miller, Y.C. Allen, K.M. Boswell, and D.L. Nieland. 2006. Effects of Depth, Location, and Habitat Type on Relative Abundance and Species Composition of Fishes Associated with Petroleum Platforms and Sonnier Bank in the Northern Gulf of Mexico. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA. OCS Study MMS 2006-037. 97 pp.

Wilson, J. 2003. Manatees in Louisiana. Louisiana Conservationist July/August 2003: 7 pp.

Wootton, E.C., E.A. Dyrynda, R.K. Pipe, and N.A. Ratcliffe. 2003. Comparisons of PAH-induced immunomodulation in three bivalve molluscs. Aquatic Toxicology 65(1): 13-25.

Würsig, B., S.K. Lynn, T.A. Jefferson, and K.D. Mullin. 1998. Behaviour of cetaceans in the northern Gulf of Mexico relative to survey ships and aircraft. Aquatic Mammals 24(1): 41-50.

Würsig, B., T.A. Jefferson, and D.J. Schmidly. 2000. The Marine Mammals of the Gulf of Mexico. College Station, TX, Texas A&M University Press. 232 pp.

Würsig, B. 2017. Marine mammals of the Gulf of Mexico, pp. 1489-1587. In: C. Ward (Ed.), Habitats and Biota of the Gulf of Mexico: Before the Deepwater Horizon Oil Spill. Springer, New York, NY.

Young, C.N. and J.K. Carlson. 2020. The biology and conservation status of the oceanic whitetip shark (*Carcharhinus longimanus*) and future directions for recovery. Reviews in Fish Biology and Fisheries 30:293-321.

Appendix E: Air Emissions Information – Form BOEM-0139

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	BP Exploration & Production Inc.
AREA	Mississippi Canyon
BLOCK	562
LEASE	OCS-G 19966
FACILITY	Nakika
WELL	003
COMPANY CONTACT	Air Quality (Donna Gyles)/Plan (Betsy Cleland)
TELEPHONE NO.	Air Quality (281-832-4985)/Plans (281-773-9088)
REMARKS	Installation of tree, jumpers and subsea infractructure for I3 well.

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:		
YEAR	NUMBER OF PIPELINES	TOTAL NUMBER OF CONSTRUCTION DAYS
2021	1	31

AIR EMISSIONS COMPUTATION FACTORS

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

Equipment/Emission Factors	units	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	REF.	DATE	Reference Links
Natural Gas Turbine	g/hp-hr		0.0086	0.0086	0.0026	1.4515	0.0095	N/A	0.3719	N/A	AP42 3.1-1& 3.1-2a	4/00	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
RECIP. 2 Cycle Lean Natural Gas	g/hp-hr		0.1293	0.1293	0.0020	6.5998	0.4082	N/A	1.2009	N/A	AP42 3.2-1	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
RECIP. 4 Cycle Lean Natural Gas	g/hp-hr		0.0002	0.0002	0.0020	2.8814	0.4014	N/A	1.8949	N/A	AP42 3.2-2	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
RECIP. 4 Cycle Rich Natural Gas	g/hp-hr	mpers and subsea inf	0.0323	0.0323	0.0020	7.7224	0.1021	N/A	11.9408	N/A	AP42 3.2-3	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
Diesel Recip. < 600 hp	g/hp-hr	1	1	1	0.0279	14.1	1.04	N/A	3.03	N/A	AP42 3.3-1	10/96	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s03.pdf
Diesel Recip. > 600 hp	g/hp-hr	0.32	0.182	0.178	0.0055	10.9	0.29	N/A	2.5	N/A	AP42 3.4-1 & 3.4-2	10/96	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s04.pdf
Diesel Boiler	lbs/bbl	0.0840	0.0420	0.0105	0.0089	1.0080	0.0084	5.14E-05	0.2100	0.0336	AP42 1.3-6; Pb and NH3: WebFIRE (08/2018)	9/98 and 5/10	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf https://cfpub.epa.gov/webfire/
Diesel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0013	4.45E-05	0.0105	N/A	AP42 3.1-1 & 3.1-2a	4/00	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
Dual Fuel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0095	4.45E-05	0.3719	0.0000	AP42 3.1-1& 3.1-2a; AP42 3.1-1 & 3.1-2a	4/00	https://cfpub.epa.gov/webfire/
Vessels – Propulsion	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	
Vessels – Drilling Prime Engine, Auxiliary	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
Vessels – Diesel Boiler	g/hp-hr	0.0466	0.1491	0.1417	0.4400	1.4914	0.0820	3.73E-05	0.1491	0.0003	USEPA 2017 NEI;TSP (units converted) refer to Diesel Boiler Reference	3/19	
Vessels – Well Stimulation	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	
Natural Gas Heater/Boiler/Burner	lbs/MMscf	7.60	1.90	1.90	0.60	190.00	5.50	5.00E-04	84.00	3.2	AP42 1.4-1 & 1.4-2; Pb and NH3: WebFIRE (08/2018)	7/98 and 8/18	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf https://cfpub.epa.gov/webfire/
Combustion Flare (no smoke)	lbs/MMscf	0.00	0.00	0.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Combustion Flare (light smoke)	lbs/MMscf	2.10	2.10	2.10	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_02-05-18.pdf
Combustion Flare (medium smoke)	lbs/MMscf	10.50	10.50	10.50	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Combustion Flare (heavy smoke)	lbs/MMscf	21.00	21.00	21.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Liquid Flaring	lbs/bbl	0.42	0.0966	0.0651	5.964	0.84	0.01428	5.14E-05	0.21	0.0336	AP42 1.3-1 through 1.3-3 and 1.3-5	5/10	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf
Storage Tank	tons/yr/tank						4.300				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Fugitives	lbs/hr/component						0.0005				API Study	12/93	https://www.apiwebstore.org/publications/item.cgi?9879d38a-8bc0-4abe-bb5c-9b623870125d
Glycol Dehydrator	tons/yr/dehydrator						19.240				2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2014	https://www.boem.gov/environment/environmental-studies/2011-gulfwide-emission-inventory
Cold Vent	tons/yr/vent						44.747				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Waste Incinerator	lb/ton		15.0	15.0	2.5	2.0	N/A	N/A	20.0	N/A	AP 42 2.1-12	10/96	https://www3.epa.gov/ttnchie1/ap42/ch02/final/c02s01.pdf
On-Ice – Loader	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Other Construction Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Other Survey Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	https://www.epa.gov/moves/nonroad2008a-installation-and-updates
On-Ice – Tractor	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Truck (for gravel island)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Truck (for surveys)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
Man Camp - Operation (max people/day)	tons/person/day		0.0004	0.0004	0.0004	0.006	0.001	N/A	0.001	N/A	BOEM 2014-1001	2014	https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/2014-1001.pdf
Vessels - Ice Management Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
Vessels - Hovercraft Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	

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

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

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

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

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Mississippi Canyon		562	OCS-G 19966	Nakika	003					Air Quality (Donna Gyles)/Plan (Be		Air Quality (281-832-4985)/Plans (2		Installation of tree, jumpers and subsea infractructure for I3 well.										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
FACILITY INSTALLATION Island Venture																									
Main Engines: 4 x CAT C2	VESSELS - Propulsion	Installation of tree	27170	1397.78782	33546.91	24	31	19.17	11.56	11.22	0.28	459.25	13.20	0.00	72.03	0.13	7.13	4.30	4.17	0.10	170.84	4.91	0.00	26.80	0.05
Egen: 1 x CAT 3512	VESSELS - Auxiliary	not applicable	1920	98.7763201	2370.63	2	5	1.35	0.82	0.79	0.02	32.45	0.93	0.00	5.09	0.01	0.01	0.00	0.00	0.00	0.16	0.00	0.00	0.03	0.00
2021	**Facility Total Emissions**							**20.52**	**12.38**	**12.01**	**0.30**	**491.70**	**14.14**	**0.00**	**77.12**	**0.14**	**7.14**	**4.31**	**4.18**	**0.10**	**171.00**	**4.92**	**0.00**	**26.82**	**0.05**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**2,157.84**			**2,157.84**	**2,157.84**	**2,157.84**		**54,852.39**	
	64.8																								
FACILITY INSTALLATION	VESSELS - Crew/Supply/Support	not applicable	7200	370.411201	8889.87	24	16	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.94	0.57	0.55	0.01	22.64	0.65	0.00	3.55	0.01
2021	**Non-Facility Total Emissions**							**5.08**	**3.06**	**2.97**	**0.07**	**121.70**	**3.50**	**0.00**	**19.09**	**0.04**	**0.94**	**0.57**	**0.55**	**0.01**	**22.64**	**0.65**	**0.00**	**3.55**	**0.01**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	
BP Exploration & Production Inc	562	OCS-G 19966	Nakika	003		

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2021	7.14	4.31	4.18	0.10	171.00	4.92	0.00	26.82	0.05
Allowable	2157.84			2157.84	2157.84	2157.84		54852.39	

DOCD AIR QUALITY SCREENING CHECKLIST

COMPANY	BP Exploration & Production Inc.
AREA	Mississippi Canyon
BLOCK	383, 429, 430, 474, 518, 519, 520, 562, 566, 607, 608, 613, 657
LEASE	RUE-G 23624, OCS-G 32316 (MC339), OCS-G 07937 (MC383), OCS-G 07944 (MC429), OCS-G 35823 (MC430), OCS-G 35825 (MC474), OCS-G 35828 (MC518), OCS-G 27278 (MC519), OCS-G 09821 (MC520), OCS-G 08823 (MC522), OCS-G 19966 (MC562), OCS-G 365253 (MC564), OCS-G 08823 (MC 566), OCS-G 09867 (MC607), OCS-G09838 (MC608), OCS-G 19974 (MC613)OCS-G 08496 (MC657)
PLATFORM	Nakika
WELL	Existing Well: MC339: K005 (PA) MC383: 001 (PA), K001, K002, K003, K004 MC429: A001, A003, A004, A005 MC430 A006 (PA), A007 MC520: H001, HH002, 003 (Manuel), 004 (Manuel 2), 005 (H-5) MC522: 001 (PA), F002, F003 (PA), F004, F006 MC562: 001 (Isabela), 002 (Isabela 2) MC564: 001 (PA) MC566: F005 MC607: 001 (PA) MC608: EA002 (PA) MC519-Fieldwood: 001, 002 MC613-Shell: C003 MC657-Shell: 001 (PA), C002, C004 Future Wells: MC383: K006, K007 ILX MC429: Moosehead/Andrina MC518: Galapagos Deep, Galapagos follow on wells, Isabela North MC519: Santa Fe, M84N, Galapagos Deep follow-on wells MC520: Nebula, Titania, Herschel Expansion (HE)-4, HE-5, HE-6, HE-7 MC522/ MC566: F-7, Fourier Deep MC562: Isabela 3 MC609-Murphy: 001 (BHL)
COMPANY CONTACT	Adalberto Garcia(Plans)/ Donna Gyles (Air Quality)
TELEPHONE NO.	Adalberto Garcia (281-995-2815) / Donna Gyles (281-832-4985)
REMARKS	Drilling, completion and tie back of Nakika Wells. Construction of subsea infrastructure for projects include manifolds, umbilicals and pipelines. Intervention and maintenance of Nakika Hub.

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:		
YEAR	NUMBER OF PIPELINES	TOTAL NUMBER OF CONSTRUCTION DAYS
2020		242
2021		197
2022		226
2023		226
2024		226
2025 - 2030		226

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	0.005505	14	1.12	3.03	AP42 3.3-1	10/96
Diesel Recip. > 600 hp.	gms/hp-hr	0.32	0.005505	11	0.33	2.4	AP42 3.4-1	10/96
Diesel Boiler	lbs/bbl	0.084	0.009075	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	0.0015	% weight
Produced Gas(Flares)	3.33	ppm
Produced Oil (Liquid Flaring)	1	% weight

Equipment/Emission Factors	units	PM	SOx	NOx	VOC	CO	REF.	DATE
West Vela MAN-STX 16V32/40	gms/hp-hr			7.22			IAPP	Aug-18
Ocean Black Hornet: Hyundai Himsen 9H32/40 and 18H32/40V	gms/hp-hr			7.22			IAPP	Nov-18
Ocean Black Lion: Hyundai Himsen 9H32/40 and 18H32/40V	gms/hp-hr			7.22			IAPP	Apr-19
Seven Arctic: Hyundai Himsen 9H32/40, 4500 kW	gms/hp-hr			7.22			IAPP	Jan-17
Seven Arctic: MTU, 1940 kW	gms/hp-hr			5.85			IAPP	Jan-17
Seven Pacific Main engines	gms/hp-hr			9.00			IAPP	Oct-17
Seven Pacific Egen 761 kW	gms/hp-hr			7.49			IAPP	Oct-17
Harvey Sub Sea Wartsila W6L32	gms/hp-hr			7.22			IAPP	Feb-17
Island Venture CAT C280-12	gms/hp-hr			6.86			IAPP	Jan-17
Island Venture CAT C280-8	gms/hp-hr			5.85			IAPP	Jan-17
Pelican Island: CAT 3516C	gms/hp-hr			5.85			IAPP	Feb-16
Q5000 Wartsila W12V26F	gms/hp-hr			6.86			IAPP	May-19

AIR EMISSIONS CALCULATIONS - FIRST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
BP Exploration & Production Inc.	Mississippi Canyon	, 519, 520, 562,	RUE-G 23624, C	Nakika	Existing Well:MC339: K005 (PA)	MC383: 001 (	Adalberto Garcia(Plans)/ Donna G	Adalberto Garcia	#REF!

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
YEAR(S)	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: Substitution likely with vessel having same/lower emissions.																
West Vela	**Average Daily Fuel Usage**			**14182**												
	Maximum Daily Fuel Usage			**31389**												
Main Engines: 6 x 10877 hp STX-MAN 16V32	PRIME MOVER>600hp diesel	65262	3152.1546	31389.00	24	4	46.00	0.79	1038.57	47.44	345.00	0.92	0.02	20.68	0.94	6.87
E-Gen: 1 x MTU 2145hp	PRIME MOVER>600hp diesel	2145	103.6035	2486.48	2	1	1.51	0.03	51.97	1.56	11.34	0.00	0.00	0.05	0.00	0.01
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	4	5.51	0.03	77.09	6.17	16.69	0.26	0.00	3.70	0.30	0.80
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	4	5.07	0.09	174.45	5.23	38.06	0.24	0.00	8.37	0.25	1.83
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	4	5.07	0.09	174.45	5.23	38.06	0.24	0.00	8.37	0.25	1.83
Ocean Black Hornet	**Average Daily Fuel Usage**			**13210**												
	Maximum Daily Fuel Usage			**34818**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	60346	2914.7118	34818.00	24	330	42.53	0.73	960.34	43.86	319.01	83.84	1.44	1892.85	86.46	628.78
Egen: Cummins 1900 kW	PRIME MOVER>600hp diesel	2548	123.0684	2953.64	2	48	1.80	0.03	61.74	1.85	13.47	0.09	0.00	2.96	0.09	0.65
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	330	5.51	0.03	77.09	6.17	16.69	21.81	0.12	305.29	24.42	66.07
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	330	5.07	0.09	174.45	5.23	38.06	20.10	0.35	690.82	20.72	150.72
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	40	5.07	0.09	174.45	5.23	38.06	2.44	0.04	83.74	2.51	18.27
Ocean Black Lion	**Average Daily Fuel Usage**			**16455**												
	Maximum Daily Fuel Usage			**23326**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	60346	2914.7118	23326.00	24	31	42.53	0.73	960.34	43.86	319.01	5.28	0.09	119.12	5.44	39.57
Egen: Cummins 1900 kW	PRIME MOVER>600hp diesel	2548	123.0684	2953.64	2	5	1.80	0.03	61.74	1.85	13.47	0.01	0.00	0.31	0.01	0.07
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	31	5.51	0.03	77.09	6.17	16.69	2.05	0.01	28.68	2.29	6.21
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	31	5.07	0.09	174.45	5.23	38.06	1.89	0.03	64.90	1.95	14.16
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	31	5.07	0.09	174.45	5.23	38.06	1.89	0.03	64.90	1.95	14.16
FACILITY INSTALLATION/CONSTRUCTION: Substitution likely with vessel having same/lower emissions.																
PIPELAY VESSELS	**DP Fuel Usage**			**9246**												
	Transit Fuel Usage			**17171**												
Seven Vega Main engines: 41300 kW	VESSELS>600hp diesel	55384	2675.0472	17171.00	24	60	39.04	0.67	1341.90	40.26	292.78	7.52	0.13	258.41	7.75	56.38
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	60	5.51	0.03	77.09	6.17	16.69	3.96	0.02	55.51	4.44	12.01
FLEX LAY/ CONSTRUCTION VESSELS	**DP Fuel Usage**			**8878**												
	Transit Fuel Usage			**22719**												
Seven Arctic Main Engines: 6 x 4500 kW	VESSELS>600hp diesel	36208	1748.8464	22719.00	24	55	25.52	0.44	576.21	26.32	191.41	9.12	0.16	205.85	9.40	68.38
Egen: 1 x 1940 kW	VESSELS>600hp diesel	2602	125.6766	3016.24	2	8	1.83	0.03	33.54	1.89	13.76	0.01	0.00	0.27	0.02	0.11
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	55	5.51	0.03	77.09	6.17	16.69	3.63	0.02	50.88	4.07	11.01
LIGHT CONSTRUCTION VESSELS (LCV)	**Average Daily Fuel Usage**			**1611**												
	Maximum Daily Fuel Usage			**3963**												
Harvey Intervention Main Engines: 14660 kW	VESSELS>600hp diesel	19659	949.5297	3963.00	24	55	13.86	0.24	476.32	14.29	103.92	1.59	0.03	54.67	1.64	11.93
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	55	5.51	0.03	77.09	6.17	16.69	3.63	0.02	50.88	4.07	11.01
DIVE VESSELS	**Average Daily Fuel Usage**			**6664**												
	Maximum Daily Fuel Usage			**15322**												
Seven Pacific Main Engines: 27300 kW	VESSELS>600hp diesel	36610	1768.263	15322.00	24	72	25.80	0.44	725.86	26.61	193.53	8.05	0.14	226.43	8.30	60.37
Egen: 1 x 761 kW	VESSELS>600hp diesel	1021	49.3143	1183.54	2	11	0.72	0.01	16.85	0.74	5.40	0.01	0.00	0.19	0.01	0.06
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	72	5.51	0.03	77.09	6.17	16.69	4.76	0.03	66.61	5.33	14.42
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	30	5.07	0.09	174.45	5.23	38.06	1.83	0.03	62.80	1.88	13.70
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	28	5.07	0.09	174.45	5.23	38.06	1.71	0.03	58.61	1.76	12.79
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	28	5.07	0.09	174.45	5.23	38.06	1.71	0.03	58.61	1.76	12.79
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	36	5.07	0.09	174.45	5.23	38.06	2.19	0.04	75.36	2.26	16.44
INTERVENTION/ MAINTENANCE Substitution likely with vessel having same/lower emissions																
Q5000	**Average Daily Fuel Usage**			**8365**												
	Maximum Daily Fuel Usage			**12827**												
Main Engines: 31,200 kW	VESSELS>600hp diesel	41840	2020.872	12827.00	24	107	29.49	0.51	632.52	30.41	221.18	10.01	0.17	214.79	10.33	75.11
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	107	5.51	0.03	77.09	6.17	16.69	7.07	0.04	98.99	7.92	21.42
Pelican Island	**Average Daily Fuel Usage**			**1751**												
	Maximum Daily Fuel Usage			**4841**												
Main Engines: 4 x CAT 3516C , 3176 hp ea.	VESSELS>600hp diesel	12702	613.5066	4841.00	24	6	8.95	0.15	163.73	9.23	67.15	0.21	0.00	3.88	0.22	1.59
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	6	5.51	0.03	77.09	6.17	16.69	0.40	0.00	5.55	0.44	1.20
Island Venture	**Average Daily Fuel Usage**			**2934**												
	Maximum Daily Fuel Usage			**5711**												
Main Engines: 4 x CAT C280-12, 2 x CAT C280-8	VESSELS>600hp diesel	27170	1312.311	6000.00	24	82	19.15	0.33	410.75	19.75	143.63	3.59	0.06	77.00	3.70	26.92
Egen: 1 x CAT 3512	VESSELS>600hp diesel	1920	92.736	2225.66	2	12	1.35	0.02	24.75	1.40	10.15	0.02	0.00	0.30	0.02	0.12
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	82	5.51	0.03	77.09	6.17	16.69	5.42	0.03	75.86	6.07	16.42
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	54	5.07	0.09	174.45	5.23	38.06	3.29	0.06	113.04	3.39	24.66
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	41	5.07	0.09	174.45	5.23	38.06	2.50	0.04	85.83	2.57	18.73
FLOTEL/ Multi-purpose Substitution likely with vessel having same/lower emissions																
Harvey Sub Sea	**Average Daily Fuel Usage**			**1122**												
	Maximum Daily Fuel Usage			**11232**												
Main Engines: 4 x Wartsila W6L32	VESSELS>600hp diesel	19033	919.2939	11232.00	24	365	13.42	0.23	302.89	13.83	100.61	29.91	0.51	675.38	30.85	224.35
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
PRODUCTION: Substitution likely with same/lower emitting engines																
Deck Crane West: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Deck Crane East: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Cold Start Air Compressor -Cummins, 110hp	RECIP.<600hp diesel	110	5.313	127.51	2	50	0.24	0.00	3.39	0.27	0.73	0.01	0.00	0.17	0.01	0.04
UHP Water Blaster - CAT C-9, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	24	50	0.61	0.00	8.48	0.68	1.84	0.36	0.00	5.09	0.41	1.10
Welding Machines: 4 x SAE-400, 68.4 hp ea	RECIP.<600hp diesel	273.6	13.21488	317.16	24	50	0.60	0.00	8.44	0.67	1.83	0.36	0.00	5.06	0.40	1.10
Ingersol Rand A825 Air Compressor, 279 hp	RECIP.<600hp diesel	279	13.4757	323.42	24	50	0.61	0.00	8.60	0.69	1.86	0.37	0.00	5.16	0.41	1.12
Nacher Air Compressor, 340 hp	RECIP.<600hp diesel	340	16.422	394.13	24	180	0.75	0.00	10.48	0.84	2.27	1.62	0.01	22.65	1.81	4.90
Nacher Hydraulic Power Unit #1: CAT 3304B, 125 hp	RECIP.<600hp diesel	125	6.0375	144.90	24	180	0.28	0.00	3.85	0.31	0.83	0.59	0.00	8.33	0.67	1.80
Hydraulic Power Unit #2: CAT 3306B, 160 hp	RECIP.<600hp diesel	160	7.728	185.47	3	50	0.35	0.00	4.93	0.39	1.07	0.03	0.00	0.37	0.03	0.08
Rental Air Compressor, Ingersoll-Rand, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	3	50	0.61	0.00	8.48	0.68	1.84	0.05	0.00	0.64	0.05	0.14
Pump Skid - GM Detroit Diesel Alisan, 192 hp	RECIP.<600hp diesel	192	9.2736	222.57	24	50	0.42	0.00	5.92	0.47	1.28	0.25	0.00	3.55	0.28	0.77
Nitrogen Compressor, 423hp	RECIP.<600hp diesel	423	20.4309	490.34	24	50	0.93	0.01	13.04	1.04	2.82	0.56	0.00	7.83	0.63	1.69
Fast Rescue Craft BUKH Steyr, 212 hp	RECIP.<600hp diesel	212	10.2396	245.75	1	52	0.47	0.00	6.54	0.52	1.41	0.01	0.00	0.17	0.01	0.04
Lifeboats: 4 x BUKH DV36RME, 35.5 hp ea	RECIP.<600hp diesel	142	6.8586	164.61	1	52	0.31	0.00	4.38	0.35	0.95	0.01	0.00	0.11	0.01	0.02
TEMP Small/Large Auxiliary Engines (various sizes)	RECIP.<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
Turbine Generator 1 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 2 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 3 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 4 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 5 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Temp 500kW Generator (671 hp)	RECIP.>600hp diesel	671	32.4093	777.82	24	50	0.47	0.01	16.26	0.49	3.55	0.28	0.00	9.75	0.29	2.13
Emergency Generator, CAT 3512TA, 1485 hp	RECIP.>600hp diesel	1485	71.7255	1721.41	24	50	1.05	0.02	35.98	1.08	7.85	0.63	0.01	21.59	0.65	4.71
Fire Water Pump 1: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Fire Water Pump 2: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	183	5.07	0.09	174.45	5.23	38.06	11.14	0.19	383.09	11.49	83.58
Turbine Generator 1 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 2 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 3 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 4 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 5 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Compressor FGW - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
Turbine Compressor FGE - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
	MISC.	**BPD**	**SCF/HR**	**COUNT**												
	Dry Oil Tank - VRU controlled	130000			24	345				3.25					672.75	
	Dry Oil Tank - uncontrolled	130000			24	20				162.50					39.00	
	FLARE- Pilot, Purge		8750		24	365		0.01	0.62	0.53	3.40		0.02	2.74	2.31	14.89
	FLARE- Upset		1250000		24	50		0.74	89.25	75.38	485.63		0.44	53.55	45.23	291.38
	PROCESS VENT-		2084		24	365				7.09					31.03	
	PROCESS VENT- Well Work		25000		24	10				85.00					10.20	
	FUGITIVES-			15000.0		365				7.50					32.85	
	GLYCOL STILL VENT- Vent to Flare		16666667		24	345				2.20					9.11	
	GLYCOL STILL VENT-uncontrolled		16666667		24	20				110.00					26.40	
Page 3 of 8 2020	**YEAR TOTAL**						**482.01**	**8.51**	**12318.04**	**958.54**	**3885.49**	**342.73**	**6.51**	**8506.11**	**1238.75**	**2862.59**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**1988.01**	**1988.01**	**1988.01**	**1988.01**	**51935.20**
	59.7															

AIR EMISSIONS CALCULATIONS - FIRST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
BP Exploration & Production Inc.	Mississippi Canyon	, 519, 520, 562,	RUE-G 23624, C	Nakika	Existing Well:MC339: K005 (PA)MC383: 001 (		Adalberto Garcia(Plans)/ Donna G	Adalberto Garcia	#REF!

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
YEAR(S)	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: Substitution likely with vessel having same/lower emissions.																
West Vela	**Average Daily Fuel Usage**			**14182**												
	Maximum Daily Fuel Usage			**31389**												
Main Engines: 6 x 10877 hp STX-MAN 16V32	PRIME MOVER>600hp diesel	65262	3152.1546	31389.00	24	268	46.00	0.79	1038.57	47.44	345.00	61.38	1.06	1385.83	63.30	460.35
E-Gen: 1 x MTU 2145hp	PRIME MOVER>600hp diesel	2145	103.6035	2486.48	2	39	1.51	0.03	51.97	1.56	11.34	0.06	0.00	2.03	0.06	0.44
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	268	5.51	0.03	77.09	6.17	16.69	17.71	0.10	247.93	19.83	53.66
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	268	5.07	0.09	174.45	5.23	38.06	16.32	0.28	561.03	16.83	122.41
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	40	5.07	0.09	174.45	5.23	38.06	2.44	0.04	83.74	2.51	18.27
Ocean Black Hornet	**Average Daily Fuel Usage**			**13210**												
	Maximum Daily Fuel Usage			**34818**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	0	0	34818.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egen: Cummins 1900 kW	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
Temporary Large/ Small 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 1	VESSELS>600hp diesel(crew/suppor	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 2	VESSELS>600hp diesel(crew/suppor	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
Ocean Black Lion	**Average Daily Fuel Usage**			**16455**												
	Maximum Daily Fuel Usage			**23326**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	60346	2914.7118	23326.00	24	97	42.53	0.73	960.34	43.86	319.01	16.51	0.28	372.74	17.03	123.82
Egen: Cummins 1900 kW	PRIME MOVER>600hp diesel	2548	123.0684	2953.64	2	14	1.80	0.03	61.74	1.85	13.47	0.03	0.00	0.86	0.03	0.19
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	97	5.51	0.03	77.09	6.17	16.69	6.41	0.04	89.74	7.18	19.42
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	97	5.07	0.09	174.45	5.23	38.06	5.91	0.10	203.06	6.09	44.30
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	40	5.07	0.09	174.45	5.23	38.06	2.44	0.04	83.74	2.51	18.27
FACILITY INSTALLATION/CONSTRUCTION: Substitution likely with vessel having same/lower emissions.																
PIPELAY VESSELS	**DP Fuel Usage**			**9246**												
	Transit Fuel Usage			**17171**												
Seven Vega Main engines: 41300 kW	VESSELS>600hp diesel	55384	2675.0472	17171.00	24	30	39.04	0.67	1341.90	40.26	292.78	3.76	0.06	129.20	3.88	28.19
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	30	5.51	0.03	77.09	6.17	16.69	1.98	0.01	27.75	2.22	6.01
FLEX LAY/ CONSTRUCTION VESSELS	**DP Fuel Usage**			**8878**												
	Transit Fuel Usage			**22719**												
Seven Arctic Main Engines: 6 x 4500 kW	VESSELS>600hp diesel	36208	1748.8464	22719.00	24	26	25.52	0.44	576.21	26.32	191.41	4.31	0.07	97.31	4.44	32.33
Egen: 1 x 1940 kW	VESSELS>600hp diesel	2602	125.6766	3016.24	2	4	1.83	0.03	33.54	1.89	13.76	0.01	0.00	0.13	0.01	0.06
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	26	5.51	0.03	77.09	6.17	16.69	1.72	0.01	24.05	1.92	5.21
LIGHT CONSTRUCTION VESSELS (LCV)	**Average Daily Fuel Usage**			**1611**												
	Maximum Daily Fuel Usage			**3963**												
Harvey Intervention Main Engines: 14660 kW	VESSELS>600hp diesel	19659	949.5297	3963.00	24	89	13.86	0.24	476.32	14.29	103.92	2.57	0.04	88.47	2.65	19.30
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	89	5.51	0.03	77.09	6.17	16.69	5.88	0.03	82.33	6.59	17.82
DIVE VESSELS	**Average Daily Fuel Usage**			**6664**												
	Maximum Daily Fuel Usage			**15322**												
Seven Pacific Main Engines: 27300 kW	VESSELS>600hp diesel	36610	1768.263	15322.00	24	52	25.80	0.44	725.86	26.61	193.53	5.81	0.10	163.53	6.00	43.60
Egen: 1 x 761 kW	VESSELS>600hp diesel	1021	49.3143	1183.54	2	8	0.72	0.01	16.85	0.74	5.40	0.01	0.00	0.13	0.01	0.04
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	52	5.51	0.03	77.09	6.17	16.69	3.44	0.02	48.11	3.85	10.41
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	15	5.07	0.09	174.45	5.23	38.06	0.91	0.02	31.40	0.94	6.85
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	13	5.07	0.09	174.45	5.23	38.06	0.79	0.01	27.21	0.82	5.94
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	45	5.07	0.09	174.45	5.23	38.06	2.74	0.05	94.20	2.83	20.55
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	26	5.07	0.09	174.45	5.23	38.06	1.58	0.03	54.43	1.63	11.88
INTERVENTION/ MAINTENANCE Substitution likely with vessel having same/lower emissions																
Q5000	**Average Daily Fuel Usage**			**8365**												
	Maximum Daily Fuel Usage			**12827**												
Main Engines: 31,200 kW	VESSELS>600hp diesel	41840	2020.872	12827.00	24	81	29.49	0.51	632.52	30.41	221.18	7.58	0.13	162.60	7.82	56.86
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	81	5.51	0.03	77.09	6.17	16.69	5.35	0.03	74.93	5.99	16.22
Pelican Island	**Average Daily Fuel Usage**			**1751**												
	Maximum Daily Fuel Usage			**4841**												
Main Engines: 4 x CAT 3516C , 3176 hp ea.	VESSELS>600hp diesel	12702	613.5066	4841.00	24	6	8.95	0.15	163.73	9.23	67.15	0.21	0.00	3.88	0.22	1.59
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	6	5.51	0.03	77.09	6.17	16.69	0.40	0.00	5.55	0.44	1.20
Island Venture	**Average Daily Fuel Usage**			**2934**												
	Maximum Daily Fuel Usage			**5711**												
Main Engines: 4 x CAT C280-12, 2 x CAT C280-8	VESSELS>600hp diesel	27170	1312.311	6000.00	24	40	19.15	0.33	410.75	19.75	143.63	1.75	0.03	37.56	1.81	13.13
Egen: 1 x CAT 3512	VESSELS>600hp diesel	1920	92.736	2225.66	2	6	1.35	0.02	24.75	1.40	10.15	0.01	0.00	0.15	0.01	0.06
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	40	5.51	0.03	77.09	6.17	16.69	2.64	0.01	37.00	2.96	8.01
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	41	5.07	0.09	174.45	5.23	38.06	2.50	0.04	85.83	2.57	18.73
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	20	5.07	0.09	174.45	5.23	38.06	1.22	0.02	41.87	1.26	9.13
FLOTEL/ Multi-purpose Substitution likely with vessel having same/lower emissions																
Harvey Sub Sea	**Average Daily Fuel Usage**			**1122**												
	Maximum Daily Fuel Usage			**11232**												
Main Engines: 4 x Wartsila W6L32	VESSELS>600hp diesel	19033	919.2939	11232.00	24	365	13.42	0.23	302.89	13.83	100.61	29.91	0.51	675.38	30.85	224.35
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
PRODUCTION: Substitution likely with same/lower emitting engines																
Deck Crane West: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Deck Crane East: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Cold Start Air Compressor -Cummins, 110hp	RECIP.<600hp diesel	110	5.313	127.51	2	50	0.24	0.00	3.39	0.27	0.73	0.01	0.00	0.17	0.01	0.04
UHP Water Blaster - CAT C-9, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	24	50	0.61	0.00	8.48	0.68	1.84	0.36	0.00	5.09	0.41	1.10
Welding Machines: 4 x SAE-400, 68.4 hp ea	RECIP.<600hp diesel	273.6	13.21488	317.16	24	50	0.60	0.00	8.44	0.67	1.83	0.36	0.00	5.06	0.40	1.10
Ingersol Rand A825 Air Compressor, 279 hp	RECIP.<600hp diesel	279	13.4757	323.42	24	50	0.61	0.00	8.60	0.69	1.86	0.37	0.00	5.16	0.41	1.12
Nacher Air Compressor, 340 hp	RECIP.<600hp diesel	340	16.422	394.13	24	180	0.75	0.00	10.48	0.84	2.27	1.62	0.01	22.65	1.81	4.90
Nacher Hydraulic Power Unit #1: CAT 3304B, 125 hp	RECIP.<600hp diesel	125	6.0375	144.90	24	180	0.28	0.00	3.85	0.31	0.83	0.59	0.00	8.33	0.67	1.80
Hydraulic Power Unit #2: CAT 3306B, 160 hp	RECIP.<600hp diesel	160	7.728	185.47	3	50	0.35	0.00	4.93	0.39	1.07	0.03	0.00	0.37	0.03	0.08
Rental Air Compressor, Ingersoll-Rand, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	3	50	0.61	0.00	8.48	0.68	1.84	0.05	0.00	0.64	0.05	0.14
Pump Skid - GM Detroit Diesel Alisan, 192 hp	RECIP.<600hp diesel	192	9.2736	222.57	24	50	0.42	0.00	5.92	0.47	1.28	0.25	0.00	3.55	0.28	0.77
Nitrogen Compressor, 423hp	RECIP.<600hp diesel	423	20.4309	490.34	24	50	0.93	0.01	13.04	1.04	2.82	0.56	0.00	7.83	0.63	1.69
Fast Rescue Craft BUKH Steyr, 212 hp	RECIP.<600hp diesel	212	10.2396	245.75	1	52	0.47	0.00	6.54	0.52	1.41	0.01	0.00	0.17	0.01	0.04
Lifeboats: 4 x BUKH DV36RME, 35.5 hp ea	RECIP.<600hp diesel	142	6.8586	164.61	1	52	0.31	0.00	4.38	0.35	0.95	0.01	0.00	0.11	0.01	0.02
TEMP Small/Large Auxiliary Engines (various sizes)	RECIP.<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
Turbine Generator 1 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 2 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 3 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 4 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 5 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Temp 500kW Generator (671 hp)	RECIP.>600hp diesel	671	32.4093	777.82	24	50	0.47	0.01	16.26	0.49	3.55	0.28	0.00	9.75	0.29	2.13
Emergency Generator, CAT 3512TA, 1485 hp	RECIP.>600hp diesel	1485	71.7255	1721.41	24	50	1.05	0.02	35.98	1.08	7.85	0.63	0.01	21.59	0.65	4.71
Fire Water Pump 1: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Fire Water Pump 2: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	183	5.07	0.09	174.45	5.23	38.06	11.14	0.19	383.09	11.49	83.58
Turbine Generator 1 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 2 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 3 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 4 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 5 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Compressor FGW - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
Turbine Compressor FGE - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
	MISC.	**BPD**	**SCF/HR**	**COUNT**												
	Dry Oil Tank - VRU controlled	130000			24	345				3.25					672.75	
	Dry Oil Tank - uncontrolled	130000			24	20				162.50					39.00	
	FLARE- Pilot, Purge		8750		24	365		0.01	0.62	0.53	3.40		0.02	2.74	2.31	14.89
	FLARE- Upset		1250000		24	50		0.74	89.25	75.38	485.63		0.44	53.55	45.23	291.38
	PROCESS VENT-		2084		24	365				7.09					31.03	
	PROCESS VENT- Well Work		25000		24	10				85.00					10.20	
	FUGITIVES-			15000.0		365				7.50					32.85	
	GLYCOL STILL VENT- Vent to Flare		16666667		24	345				2.20					9.11	
	GLYCOL STILL VENT-uncontrolled		16666667		24	20				110.00					26.40	
Page 3 of 8 2021	**YEAR TOTAL**						**422.02**	**7.54**	**10869.98**	**896.19**	**3460.20**	**305.84**	**5.96**	**7659.39**	**1200.04**	**2619.26**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**1988.01**	**1988.01**	**1988.01**	**1988.01**	**51935.20**
	59.7															

AIR EMISSIONS CALCULATIONS - FIRST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
BP Exploration & Production Inc.	Mississippi Canyon	, 519, 520, 562,	RUE-G 23624, C	Nakika	Existing Well:MC339: K005 (PA)MC383: 001 (		Adalberto Garcia(Plans)/ Donna G	Adalberto Garcia	#REF!

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
YEAR(S)	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: Substitution likely with vessel having same/lower emissions.																
West Vela	**Average Daily Fuel Usage**			**14182**												
	Maximum Daily Fuel Usage			**31389**												
Main Engines: 6 x 10877 hp STX-MAN 16V32	PRIME MOVER>600hp diesel	65262	3152.1546	31389.00	24	329	46.00	0.79	1038.57	47.44	345.00	75.35	1.30	1701.26	77.71	565.13
E-Gen: 1 x MTU 2145hp	PRIME MOVER>600hp diesel	2145	103.6035	2486.48	2	47	1.51	0.03	51.97	1.56	11.34	0.07	0.00	2.44	0.07	0.53
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	329	5.51	0.03	77.09	6.17	16.69	21.74	0.12	304.36	24.35	65.87
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	329	5.07	0.09	174.45	5.23	38.06	20.04	0.34	688.73	20.66	150.27
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	40	5.07	0.09	174.45	5.23	38.06	2.44	0.04	83.74	2.51	18.27
Ocean Black Hornet	**Average Daily Fuel Usage**			**13210**												
	Maximum Daily Fuel Usage			**34818**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	60346	2914.7118	34818.00	24	36	42.53	0.73	960.34	43.86	319.01	9.15	0.16	206.49	9.43	68.59
Egen: Cummins 1900 kW	PRIME MOVER>600hp diesel	2548	123.0684	2953.64	2	6	1.80	0.03	61.74	1.85	13.47	0.01	0.00	0.37	0.01	0.08
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	36	5.51	0.03	77.09	6.17	16.69	2.38	0.01	33.30	2.66	7.21
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	36	5.07	0.09	174.45	5.23	38.06	2.19	0.04	75.36	2.26	16.44
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	36	5.07	0.09	174.45	5.23	38.06	2.19	0.04	75.36	2.26	16.44
Ocean Black Lion	**Average Daily Fuel Usage**			**16455**												
	Maximum Daily Fuel Usage			**23326**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	0	0	23326.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egen: Cummins 1900 kW	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
Temporary Large/ Small 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 1	VESSELS>600hp diesel(crew/suppor	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 2	VESSELS>600hp diesel(crew/suppor	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/CONSTRUCTION: Substitution likely with vessel having same/lower emissions.																
PIPELAY VESSELS	**DP Fuel Usage**			**9246**												
	Transit Fuel Usage			**17171**												
Seven Vega Main engines: 41300 kW	VESSELS>600hp diesel	55384	2675.0472	17171.00	24	30	39.04	0.67	1341.90	40.26	292.78	3.76	0.06	129.20	3.88	28.19
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	30	5.51	0.03	77.09	6.17	16.69	1.98	0.01	27.75	2.22	6.01
FLEX LAY/ CONSTRUCTION VESSELS	**DP Fuel Usage**			**8878**												
	Transit Fuel Usage			**22719**												
Seven Arctic Main Engines: 6 x 4500 kW	VESSELS>600hp diesel	36208	1748.8464	22719.00	24	55	25.52	0.44	576.21	26.32	191.41	9.12	0.16	205.85	9.40	68.38
Egen: 1 x 1940 kW	VESSELS>600hp diesel	2602	125.6766	3016.24	2	8	1.83	0.03	33.54	1.89	13.76	0.01	0.00	0.27	0.02	0.11
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	55	5.51	0.03	77.09	6.17	16.69	3.63	0.02	50.88	4.07	11.01
LIGHT CONSTRUCTION VESSELS (LCV)	**Average Daily Fuel Usage**			**1611**												
	Maximum Daily Fuel Usage			**3963**												
Harvey Intervention Main Engines: 14660 kW	VESSELS>600hp diesel	19659	949.5297	3963.00	24	89	13.86	0.24	476.32	14.29	103.92	2.57	0.04	88.47	2.65	19.30
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	89	5.51	0.03	77.09	6.17	16.69	5.88	0.03	82.33	6.59	17.82
DIVE VESSELS	**Average Daily Fuel Usage**			**6664**												
	Maximum Daily Fuel Usage			**15322**												
Seven Pacific Main Engines: 27300 kW	VESSELS>600hp diesel	36610	1768.263	15322.00	24	52	25.80	0.44	725.86	26.61	193.53	5.81	0.10	163.53	6.00	43.60
Egen: 1 x 761 kW	VESSELS>600hp diesel	1021	49.3143	1183.54	2	8	0.72	0.01	16.85	0.74	5.40	0.01	0.00	0.13	0.01	0.04
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	52	5.51	0.03	77.09	6.17	16.69	3.44	0.02	48.11	3.85	10.41
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	15	5.07	0.09	174.45	5.23	38.06	0.91	0.02	31.40	0.94	6.85
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	28	5.07	0.09	174.45	5.23	38.06	1.71	0.03	58.61	1.76	12.79
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	45	5.07	0.09	174.45	5.23	38.06	2.74	0.05	94.20	2.83	20.55
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	26	5.07	0.09	174.45	5.23	38.06	1.58	0.03	54.43	1.63	11.88
INTERVENTION/ MAINTENANCE Substitution likely with vessel having same/lower emissions																
Q5000	**Average Daily Fuel Usage**			**8365**												
	Maximum Daily Fuel Usage			**12827**												
Main Engines: 31,200 kW	VESSELS>600hp diesel	41840	2020.872	12827.00	24	81	29.49	0.51	632.52	30.41	221.18	7.58	0.13	162.60	7.82	56.86
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	81	5.51	0.03	77.09	6.17	16.69	5.35	0.03	74.93	5.99	16.22
Pelican Island	**Average Daily Fuel Usage**			**1751**												
	Maximum Daily Fuel Usage			**4841**												
Main Engines: 4 x CAT 3516C , 3176 hp ea.	VESSELS>600hp diesel	12702	613.5066	4841.00	24	10	8.95	0.15	163.73	9.23	67.15	0.35	0.01	6.46	0.36	2.65
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	10	5.51	0.03	77.09	6.17	16.69	0.66	0.00	9.25	0.74	2.00
Island Venture	**Average Daily Fuel Usage**			**2934**												
	Maximum Daily Fuel Usage			**5711**												
Main Engines: 4 x CAT C280-12, 2 x CAT C280-8	VESSELS>600hp diesel	27170	1312.311	6000.00	24	40	19.15	0.33	410.75	19.75	143.63	1.75	0.03	37.56	1.81	13.13
Egen: 1 x CAT 3512	VESSELS>600hp diesel	1920	92.736	2225.66	2	6	1.35	0.02	24.75	1.40	10.15	0.01	0.00	0.15	0.01	0.06
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	40	5.51	0.03	77.09	6.17	16.69	2.64	0.01	37.00	2.96	8.01
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	41	5.07	0.09	174.45	5.23	38.06	2.50	0.04	85.83	2.57	18.73
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	20	5.07	0.09	174.45	5.23	38.06	1.22	0.02	41.87	1.26	9.13
FLOTEL/ Multi-purpose Substitution likely with vessel having same/lower emissions																
Harvey Sub Sea	**Average Daily Fuel Usage**			**1122**												
	Maximum Daily Fuel Usage			**11232**												
Main Engines: 4 x Wartsila W6L32	VESSELS>600hp diesel	19033	919.2939	11232.00	24	365	13.42	0.23	302.89	13.83	100.61	29.91	0.51	675.38	30.85	224.35
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
PRODUCTION: Substitution likely with same/lower emitting engines																
Deck Crane West: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Deck Crane East: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Cold Start Air Compressor -Cummins, 110hp	RECIP.<600hp diesel	110	5.313	127.51	2	50	0.24	0.00	3.39	0.27	0.73	0.01	0.00	0.17	0.01	0.04
UHP Water Blaster - CAT C-9, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	24	50	0.61	0.00	8.48	0.68	1.84	0.36	0.00	5.09	0.41	1.10
Welding Machines: 4 x SAE-400, 68.4 hp ea	RECIP.<600hp diesel	273.6	13.21488	317.16	24	50	0.60	0.00	8.44	0.67	1.83	0.36	0.00	5.06	0.40	1.10
Ingersol Rand A825 Air Compressor, 279 hp	RECIP.<600hp diesel	279	13.4757	323.42	24	50	0.61	0.00	8.60	0.69	1.86	0.37	0.00	5.16	0.41	1.12
Nacher Air Compressor, 340 hp	RECIP.<600hp diesel	340	16.422	394.13	24	180	0.75	0.00	10.48	0.84	2.27	1.62	0.01	22.65	1.81	4.90
Nacher Hydraulic Power Unit #1: CAT 3304B, 125 hp	RECIP.<600hp diesel	125	6.0375	144.90	24	180	0.28	0.00	3.85	0.31	0.83	0.59	0.00	8.33	0.67	1.80
Hydraulic Power Unit #2: CAT 3306B, 160 hp	RECIP.<600hp diesel	160	7.728	185.47	3	50	0.35	0.00	4.93	0.39	1.07	0.03	0.00	0.37	0.03	0.08
Rental Air Compressor, Ingersoll-Rand, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	3	50	0.61	0.00	8.48	0.68	1.84	0.05	0.00	0.64	0.05	0.14
Pump Skid - GM Detroit Diesel Alisan, 192 hp	RECIP.<600hp diesel	192	9.2736	222.57	24	50	0.42	0.00	5.92	0.47	1.28	0.25	0.00	3.55	0.28	0.77
Nitrogen Compressor, 423hp	RECIP.<600hp diesel	423	20.4309	490.34	24	50	0.93	0.01	13.04	1.04	2.82	0.56	0.00	7.83	0.63	1.69
Fast Rescue Craft BUKH Steyr, 212 hp	RECIP.<600hp diesel	212	10.2396	245.75	1	52	0.47	0.00	6.54	0.52	1.41	0.01	0.00	0.17	0.01	0.04
Lifeboats: 4 x BUKH DV36RME, 35.5 hp ea	RECIP.<600hp diesel	142	6.8586	164.61	1	52	0.31	0.00	4.38	0.35	0.95	0.01	0.00	0.11	0.01	0.02
TEMP Small/Large Auxiliary Engines (various sizes)	RECIP.<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
Turbine Generator 1 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 2 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 3 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 4 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 5 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Temp 500kW Generator (671 hp)	RECIP.>600hp diesel	671	32.4093	777.82	24	50	0.47	0.01	16.26	0.49	3.55	0.28	0.00	9.75	0.29	2.13
Emergency Generator, CAT 3512TA, 1485 hp	RECIP.>600hp diesel	1485	71.7255	1721.41	24	50	1.05	0.02	35.98	1.08	7.85	0.63	0.01	21.59	0.65	4.71
Fire Water Pump 1: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Fire Water Pump 2: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	183	5.07	0.09	174.45	5.23	38.06	11.14	0.19	383.09	11.49	83.58
Turbine Generator 1 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 2 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 3 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 4 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 5 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Compressor FGW - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
Turbine Compressor FGE - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
	MISC.	**BPD**	**SCF/HR**	**COUNT**												
	Dry Oil Tank - VRU controlled	130000			24	345				3.25					672.75	
	Dry Oil Tank - uncontrolled	130000			24	20				162.50					39.00	
	FLARE- Pilot, Purge		8750		24	365		0.01	0.62	0.53	3.40		0.02	2.74	2.31	14.89
	FLARE- Upset		1250000		24	50		0.74	89.25	75.38	485.63		0.44	53.55	45.23	291.38
	PROCESS VENT-		2084		24	365				7.09					31.03	
	PROCESS VENT- Well Work		25000		24	10				85.00					10.20	
	FUGITIVES-			15000.0		365				7.50					32.85	
	GLYCOL STILL VENT- Vent to Flare		16666667		24	345				2.20					9.11	
	GLYCOL STILL VENT-uncontrolled		16666667		24	20				110.00					26.40	
Page 3 of 8																
2022	YEAR TOTAL						**422.02**	**7.54**	**10869.98**	**896.19**	**3460.20**	**320.25**	**6.18**	**7973.31**	**1215.09**	**2717.60**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**1988.01**	**1988.01**	**1988.01**	**1988.01**	**51935.20**
	59.7															

AIR EMISSIONS CALCULATIONS - FIRST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
BP Exploration & Production Inc.	Mississippi Canyon	, 519, 520, 562,	RUE-G 23624, C	Nakika	Existing Well:MC339: K005 (PA)MC383: 001 (		Adalberto Garcia(Plans)/ Donna G	Adalberto Garcia	#REF!

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
YEAR(S)	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: Substitution likely with vessel having same/lower emissions.																
West Vela	**Average Daily Fuel Usage**			**14182**												
	Maximum Daily Fuel Usage			**31389**												
Main Engines: 6 x 10877 hp STX-MAN 16V32	PRIME MOVER>600hp diesel	65262	3152.1546	31389.00	24	293	46.00	0.79	1038.57	47.44	345.00	67.11	1.15	1515.10	69.20	503.30
E-Gen: 1 x MTU 2145hp	PRIME MOVER>600hp diesel	2145	103.6035	2486.48	2	42	1.51	0.03	51.97	1.56	11.34	0.06	0.00	2.18	0.07	0.48
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	293	5.51	0.03	77.09	6.17	16.69	19.36	0.11	271.06	21.68	58.66
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	293	5.07	0.09	174.45	5.23	38.06	17.84	0.31	613.36	18.40	133.82
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	40	5.07	0.09	174.45	5.23	38.06	2.44	0.04	83.74	2.51	18.27
Ocean Black Hornet	**Average Daily Fuel Usage**			**13210**												
	Maximum Daily Fuel Usage			**34818**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	60346	2914.7118	34818.00	24	72	42.53	0.73	960.34	43.86	319.01	18.29	0.31	412.98	18.86	137.19
Egen: Cummins 1900 kW	PRIME MOVER>600hp diesel	2548	123.0684	2953.64	2	11	1.80	0.03	61.74	1.85	13.47	0.02	0.00	0.68	0.02	0.15
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	72	5.51	0.03	77.09	6.17	16.69	4.76	0.03	66.61	5.33	14.42
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	72	5.07	0.09	174.45	5.23	38.06	4.38	0.08	150.72	4.52	32.89
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	40	5.07	0.09	174.45	5.23	38.06	2.44	0.04	83.74	2.51	18.27
Ocean Black Lion	**Average Daily Fuel Usage**			**16455**												
	Maximum Daily Fuel Usage			**23326**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	0	0	23326.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egen: Cummins 1900 kW	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
Temporary Large/ Small 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 1	VESSELS>600hp diesel(crew/suppor	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 2	VESSELS>600hp diesel(crew/suppor	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/CONSTRUCTION: Substitution likely with vessel having same/lower emissions.																
PIPELAY VESSELS	**DP Fuel Usage**			**9246**												
	Transit Fuel Usage			**17171**												
Seven Vega Main engines: 41300 kW	VESSELS>600hp diesel	55384	2675.0472	17171.00	24	30	39.04	0.67	1341.90	40.26	292.78	3.76	0.06	129.20	3.88	28.19
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	30	5.51	0.03	77.09	6.17	16.69	1.98	0.01	27.75	2.22	6.01
FLEX LAY/ CONSTRUCTION VESSELS	**DP Fuel Usage**			**8878**												
	Transit Fuel Usage			**22719**												
Seven Arctic Main Engines: 6 x 4500 kW	VESSELS>600hp diesel	36208	1748.8464	22719.00	24	55	25.52	0.44	576.21	26.32	191.41	9.12	0.16	205.85	9.40	68.38
Egen: 1 x 1940 kW	VESSELS>600hp diesel	2602	125.6766	3016.24	2	8	1.83	0.03	33.54	1.89	13.76	0.01	0.00	0.27	0.02	0.11
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	55	5.51	0.03	77.09	6.17	16.69	3.63	0.02	50.88	4.07	11.01
LIGHT CONSTRUCTION VESSELS (LCV)	**Average Daily Fuel Usage**			**1611**												
	Maximum Daily Fuel Usage			**3963**												
Harvey Intervention Main Engines: 14660 kW	VESSELS>600hp diesel	19659	949.5297	3963.00	24	89	13.86	0.24	476.32	14.29	103.92	2.57	0.04	88.47	2.65	19.30
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	89	5.51	0.03	77.09	6.17	16.69	5.88	0.03	82.33	6.59	17.82
DIVE VESSELS	**Average Daily Fuel Usage**			**6664**												
	Maximum Daily Fuel Usage			**15322**												
Seven Pacific Main Engines: 27300 kW	VESSELS>600hp diesel	36610	1768.263	15322.00	24	52	25.80	0.44	725.86	26.61	193.53	5.81	0.10	163.53	6.00	43.60
Egen: 1 x 761 kW	VESSELS>600hp diesel	1021	49.3143	1183.54	2	8	0.72	0.01	16.85	0.74	5.40	0.01	0.00	0.13	0.01	0.04
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	52	5.51	0.03	77.09	6.17	16.69	3.44	0.02	48.11	3.85	10.41
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	15	5.07	0.09	174.45	5.23	38.06	0.91	0.02	31.40	0.94	6.85
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	28	5.07	0.09	174.45	5.23	38.06	1.71	0.03	58.61	1.76	12.79
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	45	5.07	0.09	174.45	5.23	38.06	2.74	0.05	94.20	2.83	20.55
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	26	5.07	0.09	174.45	5.23	38.06	1.58	0.03	54.43	1.63	11.88
INTERVENTION/ MAINTENANCE Substitution likely with vessel having same/lower emissions																
Q5000	**Average Daily Fuel Usage**			**8365**												
	Maximum Daily Fuel Usage			**12827**												
Main Engines: 31,200 kW	VESSELS>600hp diesel	41840	2020.872	12827.00	24	81	29.49	0.51	632.52	30.41	221.18	7.58	0.13	162.60	7.82	56.86
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	81	5.51	0.03	77.09	6.17	16.69	5.35	0.03	74.93	5.99	16.22
Pelican Island	**Average Daily Fuel Usage**			**1751**												
	Maximum Daily Fuel Usage			**4841**												
Main Engines: 4 x CAT 3516C , 3176 hp ea.	VESSELS>600hp diesel	12702	613.5066	4841.00	24	10	8.95	0.15	163.73	9.23	67.15	0.35	0.01	6.46	0.36	2.65
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	10	5.51	0.03	77.09	6.17	16.69	0.66	0.00	9.25	0.74	2.00
Island Venture	**Average Daily Fuel Usage**			**2934**												
	Maximum Daily Fuel Usage			**5711**												
Main Engines: 4 x CAT C280-12, 2 x CAT C280-8	VESSELS>600hp diesel	27170	1312.311	6000.00	24	40	19.15	0.33	410.75	19.75	143.63	1.75	0.03	37.56	1.81	13.13
Egen: 1 x CAT 3512	VESSELS>600hp diesel	1920	92.736	2225.66	2	6	1.35	0.02	24.75	1.40	10.15	0.01	0.00	0.15	0.01	0.06
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	40	5.51	0.03	77.09	6.17	16.69	2.64	0.01	37.00	2.96	8.01
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	41	5.07	0.09	174.45	5.23	38.06	2.50	0.04	85.83	2.57	18.73
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	20	5.07	0.09	174.45	5.23	38.06	1.22	0.02	41.87	1.26	9.13
FLOTEL/ Multi-purpose Substitution likely with vessel having same/lower emissions																
Harvey Sub Sea	**Average Daily Fuel Usage**			**1122**												
	Maximum Daily Fuel Usage			**11232**												
Main Engines: 4 x Wartsila W6L32	VESSELS>600hp diesel	19033	919.2939	11232.00	24	365	13.42	0.23	302.89	13.83	100.61	29.91	0.51	675.38	30.85	224.35
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
PRODUCTION: Substitution likely with same/lower emitting engines																
Deck Crane West: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Deck Crane East: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Cold Start Air Compressor -Cummins, 110hp	RECIP.<600hp diesel	110	5.313	127.51	2	50	0.24	0.00	3.39	0.27	0.73	0.01	0.00	0.17	0.01	0.04
UHP Water Blaster - CAT C-9, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	24	50	0.61	0.00	8.48	0.68	1.84	0.36	0.00	5.09	0.41	1.10
Welding Machines: 4 x SAE-400, 68.4 hp ea	RECIP.<600hp diesel	273.6	13.21488	317.16	24	50	0.60	0.00	8.44	0.67	1.83	0.36	0.00	5.06	0.40	1.10
Ingersol Rand A825 Air Compressor, 279 hp	RECIP.<600hp diesel	279	13.4757	323.42	24	50	0.61	0.00	8.60	0.69	1.86	0.37	0.00	5.16	0.41	1.12
Nacher Air Compressor, 340 hp	RECIP.<600hp diesel	340	16.422	394.13	24	180	0.75	0.00	10.48	0.84	2.27	1.62	0.01	22.65	1.81	4.90
Nacher Hydraulic Power Unit #1: CAT 3304B, 125 hp	RECIP.<600hp diesel	125	6.0375	144.90	24	180	0.28	0.00	3.85	0.31	0.83	0.59	0.00	8.33	0.67	1.80
Hydraulic Power Unit #2: CAT 3306B, 160 hp	RECIP.<600hp diesel	160	7.728	185.47	3	50	0.35	0.00	4.93	0.39	1.07	0.03	0.00	0.37	0.03	0.08
Rental Air Compressor, Ingersoll-Rand, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	3	50	0.61	0.00	8.48	0.68	1.84	0.05	0.00	0.64	0.05	0.14
Pump Skid - GM Detroit Diesel Alisan, 192 hp	RECIP.<600hp diesel	192	9.2736	222.57	24	50	0.42	0.00	5.92	0.47	1.28	0.25	0.00	3.55	0.28	0.77
Nitrogen Compressor, 423hp	RECIP.<600hp diesel	423	20.4309	490.34	24	50	0.93	0.01	13.04	1.04	2.82	0.56	0.00	7.83	0.63	1.69
Fast Rescue Craft BUKH Steyr, 212 hp	RECIP.<600hp diesel	212	10.2396	245.75	1	52	0.47	0.00	6.54	0.52	1.41	0.01	0.00	0.17	0.01	0.04
Lifeboats: 4 x BUKH DV36RME, 35.5 hp ea	RECIP.<600hp diesel	142	6.8586	164.61	1	52	0.31	0.00	4.38	0.35	0.95	0.01	0.00	0.11	0.01	0.02
TEMP Small/Large Auxiliary Engines (various sizes)	RECIP.<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
Turbine Generator 1 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 2 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 3 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 4 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 5 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Temp 500kW Generator (671 hp)	RECIP.>600hp diesel	671	32.4093	777.82	24	50	0.47	0.01	16.26	0.49	3.55	0.28	0.00	9.75	0.29	2.13
Emergency Generator, CAT 3512TA, 1485 hp	RECIP.>600hp diesel	1485	71.7255	1721.41	24	50	1.05	0.02	35.98	1.08	7.85	0.63	0.01	21.59	0.65	4.71
Fire Water Pump 1: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Fire Water Pump 2: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	183	5.07	0.09	174.45	5.23	38.06	11.14	0.19	383.09	11.49	83.58
Turbine Generator 1 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 2 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 3 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 4 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 5 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Compressor FGW - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
Turbine Compressor FGE - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
	MISC.	**BPD**	**SCF/HR**	**COUNT**												
	Dry Oil Tank - VRU controlled	130000			24	345				3.25					672.75	
	Dry Oil Tank - uncontrolled	130000			24	20				162.50					39.00	
	FLARE- Pilot, Purge		8750		24	365		0.01	0.62	0.53	3.40		0.02	2.74	2.31	14.89
	FLARE- Upset		1250000		24	50		0.74	89.25	75.38	485.63		0.44	53.55	45.23	291.38
	PROCESS VENT-		2084		24	365				7.09					31.03	
	PROCESS VENT- Well Work		25000		24	10				85.00					10.20	
	FUGITIVES-			15000.0		365				7.50					32.85	
	GLYCOL STILL VENT- Vent to Flare		16666667		24	345				2.20					9.11	
	GLYCOL STILL VENT-uncontrolled		16666667		24	20				110.00					26.40	
2023	**YEAR TOTAL**						**422.02**	**7.54**	**10869.98**	**896.19**	**3460.20**	**321.39**	**6.20**	**8002.07**	**1216.27**	**2726.20**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**1988.01**	**1988.01**	**1988.01**	**1988.01**	**51935.20**
	59.7															

AIR EMISSIONS CALCULATIONS - FIRST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
BP Exploration & Production Inc.	Mississippi Canyon	, 519, 520, 562,	RUE-G 23624, C	Nakika	Existing Well:MC339: K005 (PA)MC383: 001 (		Adalberto Garcia(Plans)/ Donna G	Adalberto Garcia	#REF!

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
YEAR(S)	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: Substitution likely with vessel having same/lower emissions.																
West Vela	**Average Daily Fuel Usage**			**14182**												
	Maximum Daily Fuel Usage			**31389**												
Main Engines: 6 x 10877 hp STX-MAN 16V32	PRIME MOVER>600hp diesel	65262	3152.1546	31389.00	24	365	46.00	0.79	1038.57	47.44	345.00	83.60	1.44	1887.42	86.21	626.97
E-Gen: 1 x MTU 2145hp	PRIME MOVER>600hp diesel	2145	103.6035	2486.48	2	53	1.51	0.03	51.97	1.56	11.34	0.08	0.00	2.75	0.08	0.60
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	365	5.07	0.09	174.45	5.23	38.06	22.23	0.38	764.09	22.92	166.71
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	40	5.07	0.09	174.45	5.23	38.06	2.44	0.04	83.74	2.51	18.27
Ocean Black Hornet	**Average Daily Fuel Usage**			**13210**												
	Maximum Daily Fuel Usage			**34818**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	0	0	34818.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egen: Cummins 1900 kW	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
Temporary Large/ Small 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 1	VESSELS>600hp diesel(crew/suppor	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 2	VESSELS>600hp diesel(crew/suppor	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
Ocean Black Lion	**Average Daily Fuel Usage**			**16455**												
	Maximum Daily Fuel Usage			**23326**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	0	0	23326.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egen: Cummins 1900 kW	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
Temporary Large/ Small 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 1	VESSELS>600hp diesel(crew/suppor	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 2	VESSELS>600hp diesel(crew/suppor	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/CONSTRUCTION: Substitution likely with vessel having same/lower emissions.																
PIPELAY VESSELS	**DP Fuel Usage**			**9246**												
	Transit Fuel Usage			**17171**												
Seven Vega Main engines: 41300 kW	VESSELS>600hp diesel	55384	2675.0472	17171.00	24	30	39.04	0.67	1341.90	40.26	292.78	3.76	0.06	129.20	3.88	28.19
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	30	5.51	0.03	77.09	6.17	16.69	1.98	0.01	27.75	2.22	6.01
FLEX LAY/ CONSTRUCTION VESSELS	**DP Fuel Usage**			**8878**												
	Transit Fuel Usage			**22719**												
Seven Arctic Main Engines: 6 x 4500 kW	VESSELS>600hp diesel	36208	1748.8464	22719.00	24	55	25.52	0.44	576.21	26.32	191.41	9.12	0.16	205.85	9.40	68.38
Egen: 1 x 1940 kW	VESSELS>600hp diesel	2602	125.6766	3016.24	2	8	1.83	0.03	33.54	1.89	13.76	0.01	0.00	0.27	0.02	0.11
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	55	5.51	0.03	77.09	6.17	16.69	3.63	0.02	50.88	4.07	11.01
LIGHT CONSTRUCTION VESSELS (LCV)	**Average Daily Fuel Usage**			**1611**												
	Maximum Daily Fuel Usage			**3963**												
Harvey Intervention Main Engines: 14660 kW	VESSELS>600hp diesel	19659	949.5297	3963.00	24	89	13.86	0.24	476.32	14.29	103.92	2.57	0.04	88.47	2.65	19.30
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	89	5.51	0.03	77.09	6.17	16.69	5.88	0.03	82.33	6.59	17.82
DIVE VESSELS	**Average Daily Fuel Usage**			**6664**												
	Maximum Daily Fuel Usage			**15322**												
Seven Pacific Main Engines: 27300 kW	VESSELS>600hp diesel	36610	1768.263	15322.00	24	52	25.80	0.44	725.86	26.61	193.53	5.81	0.10	163.53	6.00	43.60
Egen: 1 x 761 kW	VESSELS>600hp diesel	1021	49.3143	1183.54	2	8	0.72	0.01	16.85	0.74	5.40	0.01	0.00	0.13	0.01	0.04
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	52	5.51	0.03	77.09	6.17	16.69	3.44	0.02	48.11	3.85	10.41
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	15	5.07	0.09	174.45	5.23	38.06	0.91	0.02	31.40	0.94	6.85
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	28	5.07	0.09	174.45	5.23	38.06	1.71	0.03	58.61	1.76	12.79
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	45	5.07	0.09	174.45	5.23	38.06	2.74	0.05	94.20	2.83	20.55
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	26	5.07	0.09	174.45	5.23	38.06	1.58	0.03	54.43	1.63	11.88
INTERVENTION/ MAINTENANCE Substitution likely with vessel having same/lower emissions																
Q5000	**Average Daily Fuel Usage**			**8365**												
	Maximum Daily Fuel Usage			**12827**												
Main Engines: 31,200 kW	VESSELS>600hp diesel	41840	2020.872	12827.00	24	81	29.49	0.51	632.52	30.41	221.18	7.58	0.13	162.60	7.82	56.86
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	81	5.51	0.03	77.09	6.17	16.69	5.35	0.03	74.93	5.99	16.22
Pelican Island	**Average Daily Fuel Usage**			**1751**												
	Maximum Daily Fuel Usage			**4841**												
Main Engines: 4 x CAT 3516C , 3176 hp ea.	VESSELS>600hp diesel	12702	613.5066	4841.00	24	10	8.95	0.15	163.73	9.23	67.15	0.35	0.01	6.46	0.36	2.65
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	10	5.51	0.03	77.09	6.17	16.69	0.66	0.00	9.25	0.74	2.00
Island Venture	**Average Daily Fuel Usage**			**2934**												
	Maximum Daily Fuel Usage			**5711**												
Main Engines: 4 x CAT C280-12, 2 x CAT C280-8	VESSELS>600hp diesel	27170	1312.311	6000.00	24	40	19.15	0.33	410.75	19.75	143.63	1.75	0.03	37.56	1.81	13.13
Egen: 1 x CAT 3512	VESSELS>600hp diesel	1920	92.736	2225.66	2	6	1.35	0.02	24.75	1.40	10.15	0.01	0.00	0.15	0.01	0.06
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	40	5.51	0.03	77.09	6.17	16.69	2.64	0.01	37.00	2.96	8.01
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	41	5.07	0.09	174.45	5.23	38.06	2.50	0.04	85.83	2.57	18.73
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	20	5.07	0.09	174.45	5.23	38.06	1.22	0.02	41.87	1.26	9.13
FLOTEL/ Multi-purpose Substitution likely with vessel having same/lower emissions																
Harvey Sub Sea	**Average Daily Fuel Usage**			**1122**												
	Maximum Daily Fuel Usage			**11232**												
Main Engines: 4 x Wartsila W6L32	VESSELS>600hp diesel	19033	919.2939	11232.00	24	365	13.42	0.23	302.89	13.83	100.61	29.91	0.51	675.38	30.85	224.35
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
PRODUCTION: Substitution likely with same/lower emitting engines																
Deck Crane West: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Deck Crane East: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Cold Start Air Compressor -Cummins, 110hp	RECIP.<600hp diesel	110	5.313	127.51	2	50	0.24	0.00	3.39	0.27	0.73	0.01	0.00	0.17	0.01	0.04
UHP Water Blaster - CAT C-9, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	24	50	0.61	0.00	8.48	0.68	1.84	0.36	0.00	5.09	0.41	1.10
Welding Machines: 4 x SAE-400, 68.4 hp ea	RECIP.<600hp diesel	273.6	13.21488	317.16	24	50	0.60	0.00	8.44	0.67	1.83	0.36	0.00	5.06	0.40	1.10
Ingersol Rand A825 Air Compressor, 279 hp	RECIP.<600hp diesel	279	13.4757	323.42	24	50	0.61	0.00	8.60	0.69	1.86	0.37	0.00	5.16	0.41	1.12
Nacher Air Compressor, 340 hp	RECIP.<600hp diesel	340	16.422	394.13	24	180	0.75	0.00	10.48	0.84	2.27	1.62	0.01	22.65	1.81	4.90
Nacher Hydraulic Power Unit #1: CAT 3304B, 125 hp	RECIP.<600hp diesel	125	6.0375	144.90	24	180	0.28	0.00	3.85	0.31	0.83	0.59	0.00	8.33	0.67	1.80
Hydraulic Power Unit #2: CAT 3306B, 160 hp	RECIP.<600hp diesel	160	7.728	185.47	3	50	0.35	0.00	4.93	0.39	1.07	0.03	0.00	0.37	0.03	0.08
Rental Air Compressor, Ingersoll-Rand, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	3	50	0.61	0.00	8.48	0.68	1.84	0.05	0.00	0.64	0.05	0.14
Pump Skid - GM Detroit Diesel Alisan, 192 hp	RECIP.<600hp diesel	192	9.2736	222.57	24	50	0.42	0.00	5.92	0.47	1.28	0.25	0.00	3.55	0.28	0.77
Nitrogen Compressor, 423hp	RECIP.<600hp diesel	423	20.4309	490.34	24	50	0.93	0.01	13.04	1.04	2.82	0.56	0.00	7.83	0.63	1.69
Fast Rescue Craft BUKH Steyr, 212 hp	RECIP.<600hp diesel	212	10.2396	245.75	1	52	0.47	0.00	6.54	0.52	1.41	0.01	0.00	0.17	0.01	0.04
Lifeboats: 4 x BUKH DV36RME, 35.5 hp ea	RECIP.<600hp diesel	142	6.8586	164.61	1	52	0.31	0.00	4.38	0.35	0.95	0.01	0.00	0.11	0.01	0.02
TEMP Small/Large Auxiliary Engines (various sizes)	RECIP.<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
Turbine Generator 1 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 2 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 3 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 4 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 5 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Temp 500kW Generator (671 hp)	RECIP.>600hp diesel	671	32.4093	777.82	24	50	0.47	0.01	16.26	0.49	3.55	0.28	0.00	9.75	0.29	2.13
Emergency Generator, CAT 3512TA, 1485 hp	RECIP.>600hp diesel	1485	71.7255	1721.41	24	50	1.05	0.02	35.98	1.08	7.85	0.63	0.01	21.59	0.65	4.71
Fire Water Pump 1: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Fire Water Pump 2: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	183	5.07	0.09	174.45	5.23	38.06	11.14	0.19	383.09	11.49	83.58
Turbine Generator 1 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 2 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 3 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 4 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 5 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Compressor FGW - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
Turbine Compressor FGE - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
	MISC.	**BPD**	**SCF/HR**	**COUNT**												
	Dry Oil Tank - VRU controlled	130000			24	345				3.25					672.75	
	Dry Oil Tank - uncontrolled	130000			24	20				162.50					39.00	
	FLARE- Pilot, Purge		8750		24	365		0.01	0.62	0.53	3.40		0.02	2.74	2.31	14.89
	FLARE- Upset		1250000		24	50		0.74	89.25	75.38	485.63		0.44	53.55	45.23	291.38
	PROCESS VENT-		2084		24	365				7.09					31.03	
	PROCESS VENT- Well Work		25000		24	10				85.00					10.20	
	FUGITIVES-			15000.0		365				7.50					32.85	
	GLYCOL STILL VENT- Vent to Flare		16666667		24	345				2.20					9.11	
	GLYCOL STILL VENT-uncontrolled		16666667		24	20				110.00					26.40	
Page 3 of 8																
2024	**YEAR TOTAL**						**362.04**	**6.57**	**9421.91**	**833.84**	**3034.91**	**317.15**	**6.13**	**7877.55**	**1211.90**	**2694.39**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**1988.01**	**1988.01**	**1988.01**	**1988.01**	**51935.20**
	59.7															

AIR EMISSIONS CALCULATIONS - FIRST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
BP Exploration & Production Inc.	Mississippi Canyon	, 519, 520, 562,	RUE-G 23624, C	Nakika	Existing Well:MC339: K005 (PA)MC383: 001 (		Adalberto Garcia(Plans)/ Donna G	Adalberto Garcia	#REF!

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
YEAR(S)	Diesel Engines	HP	GAL/HR	GAL/D												
2025 - 2030	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: Substitution likely with vessel having same/lower emissions.																
West Vela	**Average Daily Fuel Usage**			**14182**												
	Maximum Daily Fuel Usage			**31389**												
Main Engines: 6 x 10877 hp STX-MAN 16V32	PRIME MOVER>600hp diesel	65262	3152.1546	31389.00	24	365	46.00	0.79	1038.57	47.44	345.00	83.60	1.44	1887.42	86.21	626.97
E-Gen: 1 x MTU 2145hp	PRIME MOVER>600hp diesel	2145	103.6035	2486.48	2	53	1.51	0.03	51.97	1.56	11.34	0.08	0.00	2.75	0.08	0.60
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	365	5.07	0.09	174.45	5.23	38.06	22.23	0.38	764.09	22.92	166.71
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	40	5.07	0.09	174.45	5.23	38.06	2.44	0.04	83.74	2.51	18.27
Ocean Black Hornet	**Average Daily Fuel Usage**			**13210**												
	Maximum Daily Fuel Usage			**34818**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	0	0	34818.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egen: Cummins 1900 kW	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
Temporary Large/ Small 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 1	VESSELS>600hp diesel(crew/suppor	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 2	VESSELS>600hp diesel(crew/suppor	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
Ocean Black Lion	**Average Daily Fuel Usage**			**16455**												
	Maximum Daily Fuel Usage			**23326**												
Main Engines: Hyundai Himsen 9H32/40 and 18H32	PRIME MOVER>600hp diesel	0	0	23326.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egen: Cummins 1900 kW	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
Temporary Large/ Small 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 1	VESSELS>600hp diesel(crew/suppor	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 2	VESSELS>600hp diesel(crew/suppor	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/CONSTRUCTION: Substitution likely with vessel having same/lower emissions.																
PIPELAY VESSELS	**DP Fuel Usage**			**9246**												
	Transit Fuel Usage			**17171**												
Seven Vega Main engines: 41300 kW	VESSELS>600hp diesel	55384	2675.0472	17171.00	24	30	39.04	0.67	1341.90	40.26	292.78	3.76	0.06	129.20	3.88	28.19
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	30	5.51	0.03	77.09	6.17	16.69	1.98	0.01	27.75	2.22	6.01
FLEX LAY/ CONSTRUCTION VESSELS	**DP Fuel Usage**			**8878**												
	Transit Fuel Usage			**22719**												
Seven Arctic Main Engines: 6 x 4500 kW	VESSELS>600hp diesel	36208	1748.8464	22719.00	24	55	25.52	0.44	576.21	26.32	191.41	9.12	0.16	205.85	9.40	68.38
Egen: 1 x 1940 kW	VESSELS>600hp diesel	2602	125.6766	3016.24	2	8	1.83	0.03	33.54	1.89	13.76	0.01	0.00	0.27	0.02	0.11
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	55	5.51	0.03	77.09	6.17	16.69	3.63	0.02	50.88	4.07	11.01
LIGHT CONSTRUCTION VESSELS (LCV)	**Average Daily Fuel Usage**			**1611**												
	Maximum Daily Fuel Usage			**3963**												
Harvey Intervention Main Engines: 14660 kW	VESSELS>600hp diesel	19659	949.5297	3963.00	24	89	13.86	0.24	476.32	14.29	103.92	2.57	0.04	88.47	2.65	19.30
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	89	5.51	0.03	77.09	6.17	16.69	5.88	0.03	82.33	6.59	17.82
DIVE VESSELS	**Average Daily Fuel Usage**			**6664**												
	Maximum Daily Fuel Usage			**15322**												
Seven Pacific Main Engines: 27300 kW	VESSELS>600hp diesel	36610	1768.263	15322.00	24	52	25.80	0.44	725.86	26.61	193.53	5.81	0.10	163.53	6.00	43.60
Egen: 1 x 761 kW	VESSELS>600hp diesel	1021	49.3143	1183.54	2	8	0.72	0.01	16.85	0.74	5.40	0.01	0.00	0.13	0.01	0.04
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	52	5.51	0.03	77.09	6.17	16.69	3.44	0.02	48.11	3.85	10.41
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	15	5.07	0.09	174.45	5.23	38.06	0.91	0.02	31.40	0.94	6.85
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	28	5.07	0.09	174.45	5.23	38.06	1.71	0.03	58.61	1.76	12.79
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	45	5.07	0.09	174.45	5.23	38.06	2.74	0.05	94.20	2.83	20.55
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	26	5.07	0.09	174.45	5.23	38.06	1.58	0.03	54.43	1.63	11.88
INTERVENTION/ MAINTENANCE Substitution likely with vessel having same/lower emissions																
Q5000	**Average Daily Fuel Usage**			**8365**												
	Maximum Daily Fuel Usage			**12827**												
Main Engines: 31,200 kW	VESSELS>600hp diesel	41840	2020.872	12827.00	24	81	29.49	0.51	632.52	30.41	221.18	7.58	0.13	162.60	7.82	56.86
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	81	5.51	0.03	77.09	6.17	16.69	5.35	0.03	74.93	5.99	16.22
Pelican Island	**Average Daily Fuel Usage**			**1751**												
	Maximum Daily Fuel Usage			**4841**												
Main Engines: 4 x CAT 3516C , 3176 hp ea.	VESSELS>600hp diesel	12702	613.5066	4841.00	24	10	8.95	0.15	163.73	9.23	67.15	0.35	0.01	6.46	0.36	2.65
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	10	5.51	0.03	77.09	6.17	16.69	0.66	0.00	9.25	0.74	2.00
Island Venture	**Average Daily Fuel Usage**			**2934**												
	Maximum Daily Fuel Usage			**5711**												
Main Engines: 4 x CAT C280-12, 2 x CAT C280-8	VESSELS>600hp diesel	27170	1312.311	6000.00	24	40	19.15	0.33	410.75	19.75	143.63	1.75	0.03	37.56	1.81	13.13
Egen: 1 x CAT 3512	VESSELS>600hp diesel	1920	92.736	2225.66	2	6	1.35	0.02	24.75	1.40	10.15	0.01	0.00	0.15	0.01	0.06
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	40	5.51	0.03	77.09	6.17	16.69	2.64	0.01	37.00	2.96	8.01
Offshore Support Vessel 1	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	41	5.07	0.09	174.45	5.23	38.06	2.50	0.04	85.83	2.57	18.73
Offshore Support Vessel 2	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	20	5.07	0.09	174.45	5.23	38.06	1.22	0.02	41.87	1.26	9.13
FLOTEL/ Multi-purpose Substitution likely with vessel having same/lower emissions																
Harvey Sub Sea	**Average Daily Fuel Usage**			**1122**												
	Maximum Daily Fuel Usage			**11232**												
Main Engines: 4 x Wartsila W6L32	VESSELS>600hp diesel	19033	919.2939	11232.00	24	365	13.42	0.23	302.89	13.83	100.61	29.91	0.51	675.38	30.85	224.35
Temporary Large/ Small Auxiliary Engines	AUXILIARY EQUIP<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
PRODUCTION: Substitution likely with same/lower emitting engines																
Deck Crane West: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Deck Crane East: CAT 3412 DITA, 567 hp	RECIP.<600hp diesel	567	27.3861	657.27	24	365	1.25	0.01	17.48	1.40	3.78	5.47	0.03	76.58	6.13	16.57
Cold Start Air Compressor -Cummins, 110hp	RECIP.<600hp diesel	110	5.313	127.51	2	50	0.24	0.00	3.39	0.27	0.73	0.01	0.00	0.17	0.01	0.04
UHP Water Blaster - CAT C-9, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	24	50	0.61	0.00	8.48	0.68	1.84	0.36	0.00	5.09	0.41	1.10
Welding Machines: 4 x SAE-400, 68.4 hp ea	RECIP.<600hp diesel	273.6	13.21488	317.16	24	50	0.60	0.00	8.44	0.67	1.83	0.36	0.00	5.06	0.40	1.10
Ingersol Rand A825 Air Compressor, 279 hp	RECIP.<600hp diesel	279	13.4757	323.42	24	50	0.61	0.00	8.60	0.69	1.86	0.37	0.00	5.16	0.41	1.12
Nacher Air Compressor, 340 hp	RECIP.<600hp diesel	340	16.422	394.13	24	180	0.75	0.00	10.48	0.84	2.27	1.62	0.01	22.65	1.81	4.90
Nacher Hydraulic Power Unit #1: CAT 3304B, 125 hp	RECIP.<600hp diesel	125	6.0375	144.90	24	180	0.28	0.00	3.85	0.31	0.83	0.59	0.00	8.33	0.67	1.80
Hydraulic Power Unit #2: CAT 3306B, 160 hp	RECIP.<600hp diesel	160	7.728	185.47	3	50	0.35	0.00	4.93	0.39	1.07	0.03	0.00	0.37	0.03	0.08
Rental Air Compressor, Ingersoll-Rand, 275 hp	RECIP.<600hp diesel	275	13.2825	318.78	3	50	0.61	0.00	8.48	0.68	1.84	0.05	0.00	0.64	0.05	0.14
Pump Skid - GM Detroit Diesel Alisan, 192 hp	RECIP.<600hp diesel	192	9.2736	222.57	24	50	0.42	0.00	5.92	0.47	1.28	0.25	0.00	3.55	0.28	0.77
Nitrogen Compressor, 423hp	RECIP.<600hp diesel	423	20.4309	490.34	24	50	0.93	0.01	13.04	1.04	2.82	0.56	0.00	7.83	0.63	1.69
Fast Rescue Craft BUKH Steyr, 212 hp	RECIP.<600hp diesel	212	10.2396	245.75	1	52	0.47	0.00	6.54	0.52	1.41	0.01	0.00	0.17	0.01	0.04
Lifeboats: 4 x BUKH DV36RME, 35.5 hp ea	RECIP.<600hp diesel	142	6.8586	164.61	1	52	0.31	0.00	4.38	0.35	0.95	0.01	0.00	0.11	0.01	0.02
TEMP Small/Large Auxiliary Engines (various sizes)	RECIP.<600hp diesel	2500	120.75	2898.00	24	365	5.51	0.03	77.09	6.17	16.69	24.12	0.13	337.67	27.01	73.08
Turbine Generator 1 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 2 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 3 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 4 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Turbine Generator 5 - Solar Taurus 60 (diesel)	RECIP.>600hp diesel	6642	320.8086	7699.41	24	50	4.68	0.08	160.93	4.83	35.11	2.81	0.05	96.56	2.90	21.07
Temp 500kW Generator (671 hp)	RECIP.>600hp diesel	671	32.4093	777.82	24	50	0.47	0.01	16.26	0.49	3.55	0.28	0.00	9.75	0.29	2.13
Emergency Generator, CAT 3512TA, 1485 hp	RECIP.>600hp diesel	1485	71.7255	1721.41	24	50	1.05	0.02	35.98	1.08	7.85	0.63	0.01	21.59	0.65	4.71
Fire Water Pump 1: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Fire Water Pump 2: CAT 3412 DITA, 739 hp	RECIP.>600hp diesel	739	35.6937	856.65	2	50	0.52	0.01	17.91	0.54	3.91	0.03	0.00	0.90	0.03	0.20
Offshore Support Vessel	VESSELS>600hp diesel(crew/suppor	7200	347.76	8346.24	24	183	5.07	0.09	174.45	5.23	38.06	11.14	0.19	383.09	11.49	83.58
Turbine Generator 1 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 2 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 3 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 4 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Generator 5 - Solar Taurus 60 (nat gas)	TURBINE nat gas	6642	63258.408	1518201.79	24	365		0.04	19.02	0.15	12.14		0.16	83.30	0.64	53.19
Turbine Compressor FGW - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
Turbine Compressor FGE - Solar Mars 100 (nat gas)	TURBINE nat gas	15000	142860	3428640.00	24	365		0.08	42.95	0.33	27.42		0.36	188.13	1.45	120.11
	MISC.	**BPD**	**SCF/HR**	**COUNT**												
	Dry Oil Tank - VRU controlled	130000			24	345				3.25					672.75	
	Dry Oil Tank - uncontrolled	130000			24	20				162.50					39.00	
	FLARE- Pilot, Purge		8750		24	365		0.01	0.62	0.53	3.40		0.02	2.74	2.31	14.89
	FLARE- Upset		1250000		24	50		0.74	89.25	75.38	485.63		0.44	53.55	45.23	291.38
	PROCESS VENT-		2084		24	365				7.09					31.03	
	PROCESS VENT- Well Work		25000		24	10				85.00					10.20	
	FUGITIVES-			15000.0		365				7.50					32.85	
	GLYCOL STILL VENT- Vent to Flare		16666667		24	345				2.20					9.11	
Page 3 of 8	GLYCOL STILL VENT-uncontrolled		16666667		24	20				110.00					26.40	
2025 - 2030	**YEAR TOTAL**						**362.04**	**6.57**	**9421.91**	**833.84**	**3034.91**	**317.15**	**6.13**	**7877.55**	**1211.90**	**2694.39**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**1988.01**	**1988.01**	**1988.01**	**1988.01**	**51935.20**
	59.7															

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	PLATFORM
BP Exploration &	Mississippi Canyon	383, 429, 430, 474, 518, 519, 520, 562, 566, 607, 608, 613, 657	RUE-G 23624, OCS-G 32316 (MC339), OCS-G 07937 (MC383), OCS-G 07944 (MC429), OCS-G 35823 (MC430), OCS-G 35825 (MC474), OCS-G 35828 (MC518), OCS-G 27278 (MC519), OCS-G 09821 (MC520), OCS-G 08823 (MC522), OCS-G 19966 (MC562), OCS-G 365253 (MC564), OCS-G 08823 (MC 566), OCS-G 09867 (MC607), OCS-G09838 (MC608), OCS-G 19974 (MC613)OCS-G 08496 (MC657)	Nakika

Year	Emitted			Substance
	PM	SOx	NOx	VOC
2020	342.73	6.51	8506.11	1238.75
2021	305.84	5.96	7659.39	1200.04
2022	320.25	6.18	7973.31	1215.09
2023	321.39	6.20	8002.07	1216.27
2024	317.15	6.13	7877.55	1211.90
2025 - 2030	317.15	6.13	7877.55	1211.90
Allowable	1988.01	1988.01	1988.01	1988.01

AIR EMISSIONS CALCULATIONS

WELL
Existing Well: MC339: K005 (PA) MC383: 001 (PA), K001, K002, K003, K004 MC429: A001, A003, A004, A005 MC430 A006 (PA), A007 MC520: H001, HH002, 003 (Manuel), 004 (Manuel 2), 005 (H-5) MC522: 001 (PA), F002, F003 (PA), F004, F006 MC562: 001 (Isabela), 002 (Isabela 2) MC564: 001 (PA) MC566: F005 MC607: 001 (PA) MC608: EA002 (PA) MC519-Fieldwood: 001, 002 MC613-Shell: C003 MC657-Shell: 001 (PA), C002, C004 Future Wells: MC383: K006, K007 ILX MC429: Moosehead/Andrina MC518: Galapagos Deep, Galapagos follow on wells, Isabela North MC519: Santa Fe, M84N, Galapagos Deep follow-on wells MC520: Nebula, Titania, Herschel Expansion (HE)-4, HE-5, HE-6, HE-7 MC522/ MC566: F-7, Fourier Deep MC562: Isabela 3

CO
2862.59
2619.26
2717.60
2726.20
2694.39
2694.39
51935.20

M/V "ISLAND VENTURE"

Offshore Construction and Light Well Intervention Vessel

Island Venture is a highly advanced, multifunctional OCV/SURF/LWI vessel with exceptional performances with regards to sea keeping/station keeping capacities and stability, having the bow concept ULSTEIN X-BOW.

The vessel is equipped with a diesel-electric power plant serving three main azimuth thrusters, two retractable thruster and two side thrusters. The vessel is equipped and certified according to IMO Class III for Dynamic Positioning, ensuring the vessel to obtain the best capabilities in DP manoeuvring.

The vessel is built for world wide operation and outfitted to perform the following operations:

- Well Intervention Services
- Top Hole Drilling
- Sub Sea Construction- and Equipment Installation (OCV)
- Inspection, Maintenance and Repair (IMR/SURF)
- ROV Services
- Accommodation

The vessel surpasses industry standards with regards to performance and operability, and fully complies with requirements for energy efficiency and conservation.

Main characteristics

Deadweight @ 9m draught	11500 t	Length overall	150.0 m
Main deck area	2100 m^2	Breadth moulded	30.0 m
Max speed (d=7.0 m)	14.0 knots	Depth to main deck	12.0 m
Sustained speed (d=9.0m)	12.0 knots	Design draught	8.0 m
Generator power	19400 eKW	Draught, max	9.0 m

M/V ISLAND VENTURE For Advanced Marine Operations

MAIN FEATURES

Flexibility

TBN has been designed with flexibility as a core attribute. The large deck area is ideal for a variety of operations, making the ship suitable for multiple market segments within the subsea construction market. Diving systems can be attached to the vessel, designed with SURF capabilities, while two ROVs can also be accommodated.
The large capacity of 200 persons also makes this vessel suitable for accommodation operations.

Capacity

This new vessel has the capacity to handle heavy lifting operations within the demanding subsea and offshore environments thanks to a 400 t AHC crane. The crane can be utilized to its impressive maximum capacity of - a boon for multiple market use - while the ship still complies fully with the stringent requirements of the SPS 2008 code.

400t AHC Crane

Increased range at 15 meters and lifting height approx. 36 meters, make NOV. Wire length 4000m.
One additional 140 t AHC crane, make NOV. Wire length 2500m

ROV moonpools

Two ROV moonpools are arranged along the centerline of the vessel.

Increased power plant

Total installed power of 19400 ekW, configured with 6 main diesel gen. sets and a 3 split main switchboard.
The main switchboard is built for operation in DPS-3 mode with closed bus-ties.

Large Offshore switchboard

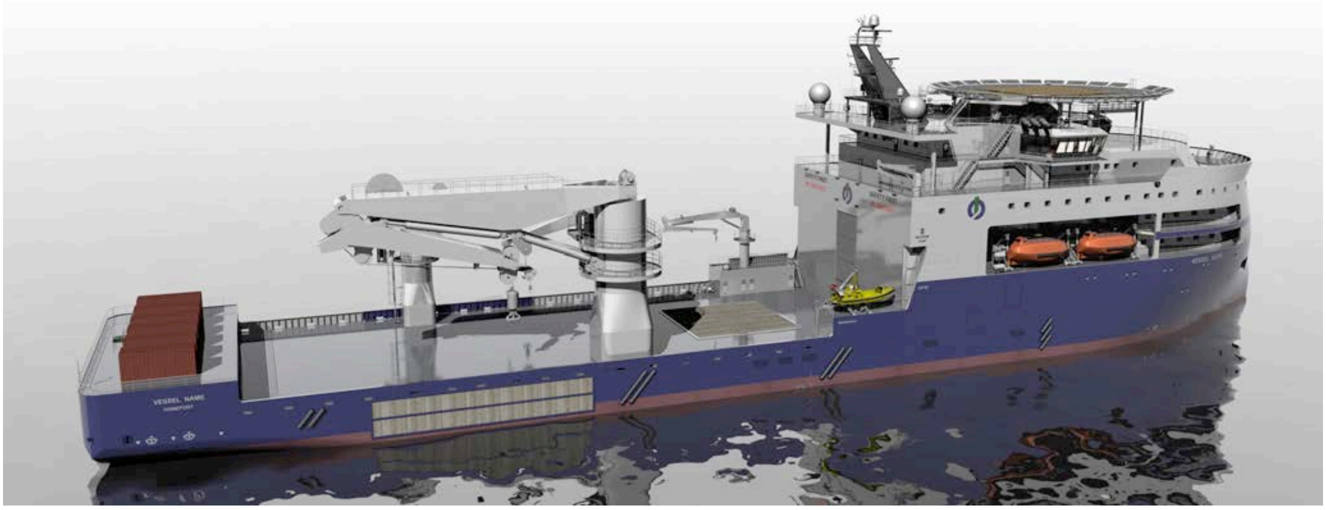
Capacity 2 x 4200 kVA
The switchboard supplies the large offshore crane, ROV system and is further equipped with additional feeders for future topside consumers

Increased thruster capacity

3 x 3300 kW main thrusters
2 x 2200 kW fwd. bow thrusters
2 x 2500 kW fwd. azimuth thrusters

Additional redundancy in DPS-3

Propulsion and Power Systems are arranged to tolerate occurrence of a “single failure” including fire & flooding, i.e. vessel to keep position and remain redundant as defined by class after such “single failure”.
I addition, the engine areas, switchboard rooms, propulsion rooms, thruster rooms and instrument/technical rooms are split in 3 parts with A60 integrity.



1. SHIP GENERAL

General Description

The vessel has been designed for Light Well Intervention and Sub Sea Construction. The ship is able to fulfil the following duties:

- Sub Sea Construction and Equipment Installation
- Plug and abandonment work/SURF
- Top hole drilling

Scheduled delivery of the vessel is June 2015.

Together with the enclosed General Arrangement plan, U10865-101-100, this specification describes a large Inspection Maintenance and Repair / Offshore Construction Vessel. The solution is hereafter referred to as the Vessel

The basic principle for the design of this Vessel is to meet operational demands with the most efficient solutions. The Vessel shall be able to fulfil the general demands of the offshore industry for installing, inspecting, maintaining and repair of submerged installations as well as for Sub Sea survey and general operation of

The Vessel is designed with a large crane, large construction/ module handling moonpool and accommodation for two ROVs.

Furthermore, the Vessel is equipped with a high redundancy DP and propulsion system, anti-heeling system for the crane operations and a passive stabilising system built into the hull.

The Vessel is built for world wide service as described by Classification Society.

The Vessel including the ULSTEIN X-bow® and the ULSTEIN Diesel Electric Propulsion System ensures exceptional performances with regards to fuel consumption, seaworthiness, station keeping, speed, stability and cargo capacity.

The Vessel is arranged with accommodation and machinery sections forward.
A work deck is arranged on the main deck from frame #-12 to frame #104.

The main propulsion system installation comprises three azimuth thrusters in nozzles, fixed pitch propeller type. Each propeller is driven by frequency controlled variable speed electrical motor.

Two retractable azimuth thrusters and two tunnel thrusters are installed in the forward part of the Vessel. All thrusters are also driven by frequency controlled variable speed motors and controllable pitch propellers.

The Vessel's machinery and all equipment shall be suitable for operation under tropical climatic conditions.

The Vessel is arranged for totally 200 persons accommodated in 54 single cabins and 73 double cabins
.

Main Specifications

Length overall: Approx.	150.0 m
Length between perpendiculars: Approx.	137.0 m
Breadth moulded: Approx.	30.0 m
Depth from Main deck:	12.0 m
Max draught:	9.0 m
Freeboard at max. draught: Approx.	3.0 m
Design draught:	8.0 m
Freeboard at design draught:	4.0 m

Tonnage, Capacities

Fuel Oil (MDO):		1240 m³
Portable fresh water:		1000 m³
Liquid mud (2,8)		706 m^3
Brine/Light Mud(1,8)		820 m^3
MEG:		368m^3
Base Oil/Fuel oil		400 m^3
Low flashpoint liquid >43°C		250 m^3
Drill/Ballast water:		10000 m³
Lub. Oil:	Approx.	80 m³
Hydr. Oil:	Approx.	20 m³
Sewage:	Approx.	350 m³
Bilge/ Sludge/ Drop tank:	Approx.	60 m³
Urea:	Approx.	180 m³

Total deck area main deck 2.300 m^2

Mezzanine deck aft 422m^2

Deck load (VCG 1 m above M-deck): Approx. 6.500 t

10 t/m^2, 15t/m^2 aft of #63 with crane & 2 off LARS installed

Calculated deck load is based on offshore crane data as defined in Sub Group 331.

Deadweight at 9.0 m draught: Approx. 11.500 t

With Offshore crane

Calculated deadweight is based on offshore crane data as defined in Sub Group 331.

Performance

Trial speed at design draught in sea state 0-1 is approx. 14.0 knots.

Station-keeping capability:
Vessel is able to achieve:

- DPS-3 SKP 99,99,99,99

In addition calculations according to DNV ERN (99,99,99,99) to be performed (2011 rules to be used)

Class, Certificates and Regulations

The Vessel is designed to comply with rules, regulations and requirements laid down by the Flag State, IMO and the Classification Society (hereafter referred to as the Class).

Flag: NIS

Call sign: TBA
DNV ID: TBA

IMO: Conventions, Codes and Resolutions that are adopted by the Flag State.
IMO NR:

SOLAS Chapter II-1, part B-1. Damage stability.IMO Resolution A.469(XII) – Guide lines for the design and construction of offshore supply vessels.

Class: ABS: ✠1A1, Offshore support vessel (Supply – HNLS), Circle-E, ✠AMS, ✠ACCU, ✠DPS-3 SKP (a, b, c, d, e, f), ENVIRO, GP, HAB(WB), UWILD, SPS, HDC, HLC, ROV, HL, BWT, HELIDK, MLC-ACCOM, NIBS, Pot.

Reference System

All numerical units refer to the metric, SI system of measurement.

Operational Environment

The Vessel systems are designed for service with the following environmental conditions:
Ambient air temperature between –19 °C to +35 °C and sea temperature from 0 °C up to 32 °C.

Building Method and Workmanship

All workmanship is carried out according to approved drawings. Steel work is carried out accordingly and in compliance with IACS Rec.47 "Shipbuilding and Remedial Quality Standard for New Construction".

The Vessel with machinery, equipment and accessories in all aspects is appropriate and robust. Due consideration to be given to obtain easy access for operation of equipment and machinery and, as far as practicable, to obtain good access for future maintenance and repair.

The electrical installation to be according to IEC norms, and when relevant, DIN norms.

Spare Parts

Spare parts for all equipment, machinery etc. according to requirements from Class, relevant authorities and according to suppliers' normal standard.

Instruction manuals

Instruction Manuals in four copies for all machinery and equipment is delivered. Manuals are in English.

Maintenance and Spare Part System

Maintenance and spare part system including software, computers, printers and implementation of maintenance procedures and spare part data is installed.

2. HULL AND STRUCTURE

Hull Materials

All materials is new and of marine quality according to Class regulations, and where required, with certificates. Materials are suitable for the service intended with this Vessel.

Blasting, Shop priming, Cleaning of materials

Steel building materials are grit blasted, and primer of approved type is applied. Paint work is performed on clean surfaces, according to manufacturer recommendations for specified coating.

Steel Construction in General

All dimensioning is according to Class requirements and recommendations from noise and vibrations analysis.
Frame spacing is 700 mm.
Hull structure is strengthened for docking with 500t FO, 1000t of additional deadweight and ballast as minimum required in order to achieve even keel.

Fenders

8 off rubber D-fenders, each with length according to final arrangement, arranged on flat side both port and starboard side according to the General Arrangement plan.

Moonpool

The hull is equipped with a moonpool with net opening of approx. 11.2 x 12m and arranged with a surrounding splash zone of sufficient size. Transition from moonpool to bottom of Vessel shall be done by a radius of approx. 100 mm.
The moonpool shall be equipped with sufficient air ventilation to either ship side.

ROV Hangar

The dual ROV hangar is built as a welded steel construction and is an integrated part of the superstructure. The hangar is equipped with lifting arrangements for handling of e.g. ROV tooling and parts. An aft door of approx. 5 x 7 m for transportation of ROV, tooling and parts is arranged.

ROV Launch and Recovery System (LARS)

The Vessel is equipped with 2 off LARS system for launching trough separate moonpools. Each moonpool measuring 4.9 x 4.9 m.

Crane Foundation

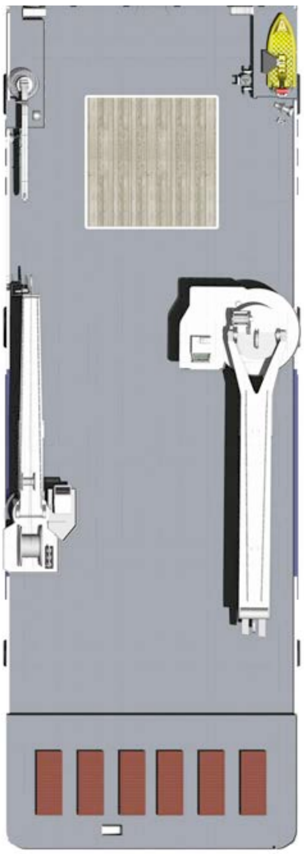
Foundation for an offshore working crane is arranged as indicated in General Arrangement drawing, approx. frame #59 at starboard side, and dimensioned for a crane with 400 t SWL at 15 m outreach.
A foundation for a future 140t crane is arranged on the port side, approx. frame #34.
Additional foundation for a future 20t crane is arranged on the starboard side, approx. frame #90.

Moonpool Tower Foundation

Foundation for a construction / Well intervention tower shall be arranged on the main deck level at each corner of the moonpool as indicated on the General Arrangement plan.

Impressed Current Protection

An impressed current cathode protection system is fitted.



Main Offshore Crane

1 off Main-/ Offshore crane, heave compensated knuckle boom type. Crane is arranged at the starboard side.
The crane is capable for ship to ship operational lifting.

Main winch capacity:			**4000m wire**
Type of lifts	**Hook load SWL** Air load	**Load radius**	**Crane load**
	tonnes	meter	tonnes
Harbour	120	40	
	400	19	
Internal	104	40	
	400	17	
Sub-sea	104	40	
	400	15	
AHC lift	~260	15	400
Sea lift	~75	40	
	250	20	

Auxiliary winch capacity:			**3000m wire**
Type of lifts	**Hook load SWL** Air load	**Load radius**	**Crane load**
	tonnes	meter	tonnes
Internal	20	43	
	40	43	
Sub-sea	20	43	
	~10	43	~20
AHC lift	20	43	
	~10	43	~20
Sea lift	20	43	
	40	43	

Second Offshore Crane

1 off Main- / Offshore crane, heave compensated knuckle boom type. Crane is arranged at port side.
Crane spec Ship to ship operational lifting.
Main Capacity: Wire length 2500m
- 140 t - 11 m outreach AHC
Auxiliary winch 20t SWL at 32m(ship to ship)
Wire length 2500m

Deck cranes for cargo

1 off Electro hydraulic knuckle boom crane with single wire. The crane is arranged on port side A-deck, approx. frame #95.
The crane is fitted with a radio control.

Lifting capacity:
25t @ 14m outreach
14t @ 24m outreach

1 off Electro hydraulic knuckle boom crane with single wire. The crane is arranged on starboard side on the top of the ROV hangar.
The crane is fitted with a radio control.

Lifting capacity:
25t @ 14m outreach
14t @ 24m outreach

1 off Electro hydraulic crane is arranged inside the ROV hangar

Lifting capacity:
-2 t - 10 m outreach

1 off Lifting appliance arranged in the ROV area for transporting ROV with associated equipment from ROV hangar to main deck.

Hoisting Winches

2 off Tugger winches. Pull capacities 10 t pull at first layer. Drum capacities approx. 225 m of 24 mm wire. Mooring winches on aft deck are arranged for use as tugger winches.

Loading / Discharge Pumps

Qty.	Pump	Capacity
1 off	Fresh water cargo pump. Centrifugal type. El. motor, frequency contr.	150 m³/h – 6 bar
2 off	MEG pump. Centrifugal type. El. motor, frequency contr.	100 m³/h – 9 bar
2 off	Low flashpoint liquid pump Centrifugal type. Hydr. motor	75 m³/h – 9 bar
2 off	MUD pump Eccentric screw type. Hydr motor.	75 m³/h – 24 bar

Centrifugal type pumps with suction point significantly lower than intake of pump is fitted with ejector for purging.
One frequency converter for each electrical driven cargo pump.
Frequency converters for cargo pumps are remotely controlled from the IAS-system.

Loading / Discharge System on Deck

System **Dim** **Location**

Fresh water	4”	Midship.	PS / SB
MEG	5”	Midship.	PS / SB
LFL	4”	Midship.	PS
MUD	5”	Midship.	PS / SB

Loading / Discharge Systems in Pump Room

General
Discharge pipes for cargo systems are used as filling lines with bypass line at pumps.
Non return valves are installed at pressure side of all cargo pumps.
The cargo system is remotely controlled from the IAS-system. Blind flanges between combined systems are arranged. Remote operated valves for cargo systems are with electric actuator.
Arrangements for taking samples on load and discharge side on all cargo tanks are arranged.

Fresh water system
Pipe system is designed with transfer possibility between fore and aft ship and discharge to main deck.
Pipe with valve and hose connection for stripping of each FW cargo tanks are installed.

MEG system
High level alarm sensor inside MEG tanks. Sensors are mounted below main deck and connected to IAS cargo control system.
Loading/discharge filters with bypass possibilities and discharge to deck.

LFL system
Pipe system is designed with pumps submerged in cofferdam with transfer to deck.
Inert gas system is arranged for purging and padding of LFL pipes and tanks, and for supply to cofferdam surrounding LFL tanks.

2 off Bilge ejector, capacity approx. 40m^3/h, submerged in cofferdam surrounding LFL tanks.

2 off Bilge ejector, capacity approx. 15m^3/h, submerged in cofferdams outside LFL tanks.

Pressure transmitter with remote readout is installed in each LFL tank and cofferdams.

MUD system
High level alarm sensors inside mud tanks indicate 95% and 98% of tank volume. Sensors are mounted below main deck and connected to the cargo control system.
All pipes for the mud system are hot dip galvanized.
Loading/discharge filters with bypass possibilities is located on main deck.

Inert gas system
An inert gas piping system for purging and padding of LFL pipes and tanks with cofferdams is arranged.

1 off Inert gas generator, capacity approx. 100Nm^3/h with 97% nitrogen (N_2) purity
1 off Inert gas receiver, capacity 1000 litres. 10 bar

Side Thrusters

2 off Tunnel thrusters forward with low noise propeller blades.
Variable speed, variable pitch type, with frequency converter.
Propeller diameter approx.: 2750 mm
Motor rating approx.: 2200 kW at 900 rpm.
Electric motor is fresh water cooled.

2 off Retractable compass thrusters in nozzle.
Variable speed, variable pitch type, with frequency converter.
Propeller diameter approx.: 2600 mm.
Motor rating approx.: 2500 kW at 900 rpm.
Electric motor is fresh water cooled.

Roll Reduction System

3 off Passive roll reduction tank are located below main deck. One in the aft ship and two in the fore ship.

Anti-heeling System

1 off Active anti-heeling tank system. System is interfaced with main crane with automatically and manually operated with remotely control from the bridge.

System to comprise:
6 off Wing tanks, approx. 500 m^3 each.
3 off Pumps w/el. motors, each approx. 800 m^3/ 1.5 bar.
Total moment enforced approx. 14000 tm/15 min.
Medium is ballast water.

Dynamic Positioning

Dynamic positioning system, class ABS DPS-3, comprising the following main components and software modes, reference systems and interfaces:

Components

- 3 off Operator stations.
- 1 off Redundant controller.
- 3 off UPS power supplies.
- 2 off Printer.

Reference systems

- 1 off Dual BM Veripos DGPS system consisting of:
  1 off LiD6-GG2
  1 off LD6-G2
- 1 off BM Veripos LiD5-GG2 DGPS system
- 1 off Ranger 2 Pro USBL system with HPT 5000 Transceiver. Remote operated gate valve, ND 350
- 1 off Ranger 2 Pro USBL system with HPT 7000 Transceiver. Remote operated gate valve, ND 350
- 1 off BM Mini RadaScan
- 1 off Spot beam system

Sensors

- 3 off Static wind sensors.
- 3 off Motion reference units
  1 off x-y-z direction
  2 off x-y direction
- 1 off Gyro compass system comprising 3 off gyros (combined with navigation)

Interfaces

- 2 off Tunnel thrusters
- 2 off Azimuth thruster
- 3 off Main azimuth thrusters
- 2 off DP survey box for connection of sensors and position reference systems to external equipment located in the survey area

DP-status lights

DP-status lights are installed on bridge, ECR, ROV control room, ROV hangar, survey room, client office, operation offices, outside on A-deck and main deck

Joystick system

The vessel is equipped with a joystick system which integrates control of the main azimuth propellers rpm and 4 off thrusters fwd simultaneously in 1 single control lever. The system to include 1 off fixed joystick panel with 1 off lever in aft wheelhouse/DP console and 1 off fixed joystick panel in each bridge wing.

Radar System

- 1 off S-band ARPA radar, 26" colour display and 14" scanner, 30kW.
- 1 off X-band ARPA radar, 26" colour display and 8" scanner, 25kW.

Performance monitor for both radars.
Both radars shall have gyro interface. Radar interswitch is provided.

- 1 off ECDIS charting system with separate planning station (2 off separate stations).

Navigation System

- 2 off GPS for navigation.

Gyrocompass system consists of:

- 3 off Gyro compasses.
- 1 off Analogue repeater for console.
- 3 off Digital repeaters (in steering gear rooms)
- 2 off Analogue bearing repeaters with 1 off azimuth circle.

The gyros are placed in instrument rooms.

Autopilot system consists of:

- 1 off Control panel in conning position.
- 1 off Electronic unit with interface to gyro and steering gear.

Underwater Searching Equipment, Echo Sounder, Speed Log

- 1 off Navigation echo sounder with slave depth indicator. 4 off aux. NMEA outputs for future options.
- 1 off Doppler speed log with transducer valve and remote indicator. 4 off aux. NMEA outputs for future options.

Clinometers, Trim Indicators, Load Indicators

- 2 off Depth sounding pipes with connection to tank level measuring system are installed, one forward and one aft.

Loading computer software is installed and interfaced to tank level measuring system.

Misc. Nautical Equipment

- 1 off Sound reception system.

1 off Automatic Identification System (AIS).
1 off Voyage Data Recorder (VDR).
1 off Conning computer system with 2 off monitors.
1 off Bridge alarm system.
1 off Watch monitoring system.
1 off Ship Security Alert System (SSAS).
1 off Helicopter monitoring system.

Communication Equipment

A complete GMDSS A3 installation is provided. Additional equipment over and above GMDSS requirements is also mentioned in section below.

Radio Plant, GMDSS

1 off MF/HF SSB simplex radio station with 150 W transmitter and DSC.
1 off Navtex receiver, paperless type.
1 off GMDSS power system.
1 off GMDSS alarm panels.

The radio battery system is supplying the radio station. Charger is built into the radio station or is separate. The batteries shall also supply one of the VHF radios and the emergency light in the radio area.

Lifeboat Radio Transmitters, EPIRBS

1 off Manual EPIRB for wheelhouse
1 off Automatic EPIRB for wheelhouse roof
2 off Radar transponder/AIS transponder
3 off Portable GMDSS VHF units with charger and spare battery.
1 off Ship Secutriy Alarm System (SSAS)
1 off Long Range Identification Tracking (LRIT)

Data Transmission Plants, Communications

2 off Satcom-C, part of GMDSS

VHF/ UHF

2 off Simplex VHF with DSC, part of GMDSS. Overhead fwd and radio station.
3 off Portable UHF ATEX w/helmcom kit.
6 off Smoke diver kit for portable UHF.
2 off Fixed UHF aft bridge.
1 off Fixed UHF fwd. bridge.
1 off Fixed UHF in engine control room.
2 off Fixed VHF air band radios.
1 off Portable VHF air band radios.
1 off Helicopter beacon.
1 off GSM cellular phone connected to the ship telephone system.

Telephone

An IP based PABX system with interface to the PA system and alarm signal plant is installed. The system has interfacing for external inputs from equipment like Fleet 77 Broadband, V-Sat system and GSM cellular (16 lines in total).
Paging function with trigging to the IAS system is provided. The PABX cable system is a part of the on-board common distribution system.

Open Line Communication

A separate open line communication system, make ClearCom, is arranged in all operational key areas such as the bridge, ROV control room, ROV hangar, ECR, offshore crane, survey desk and operation offices.

Anchoring and Mooring Equipment

The deck machinery is hydraulic type, and includes:
2 off Mooring winch aft, single drum, 10 t pull at 1. layer.
2 off Windlass/ mooring winch including HPU according to Class with 2 rope drums.
2 off Anchors SPEK-type according to Class.
2 off Bollards aft, Ø400 mm.
4 off Bollards fore, Ø400 mm.
4 off Bollards mid ship (two on each side), Ø400 mm.

Common Hydraulic Oil System

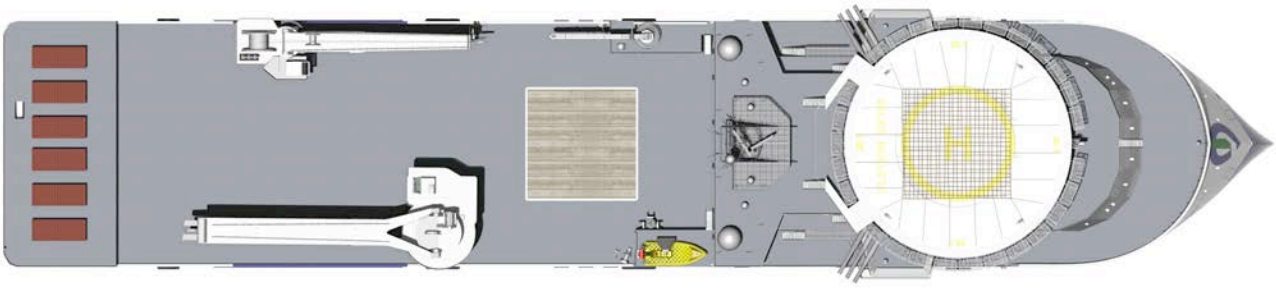
1 off Complete high pressure hydraulic power pack for ROV and hydraulic deck equipment.
1 off Hydraulic oil transfer pump, capacity approx. 2.9 m^3/h at 6 bar.

High-pressure Cleaning Machine

1 off High-pressure cleaning machine, capacity 160 bar with hot and cold water.

Garbage Disposal Plants

1 off Incinerator plant with lock gate. Capacity approx. 1 000 000 kcal/h
1 off Waste/Sludge mixing tank approx. 1.5m^3
1 off Stationary compactor, capacity 1,5m^3



Lifesaving, Safety and Emergency Equipment

All safety equipment is of approved type and arranged according to SOLAS and NMA Regulations for Mobile Offshore Units as described in Main Group 1.

Lifeboats with equipment

2 off	MOB-boat of approved type with rigid hull, inboard diesel engine of 200 hp and water jet propulsion. Min. 25 kn. with 10 persons onboard Boat is equipped with rescue scoop
2 off	Single-point davit with shock damping for launching and recovery of the MOB boat
4 off	Enclosed lifeboats with equipment of approved type for 100 persons each
4 off	Davit for lifeboat

Liferafts with equipment

6 off	Life rafts, 35 persons each. 3 on each side
2 off	Launching and evacuation system/davits
2 off	Embarkation ladders, one on each side on main deck

Emergency equipment

200 off	Survival suits
200 off	Lifejackets (stored at the muster station)
200 off	Lifejackets (stored in each cabin)
6 off	Fireman’s outfit
12 off	Emergency escape breathing device
18 off	Life buoys

Accommodation and Inventory

The Vessel shall be arranged for totally 200 persons accommodated in 54 single cabins and 73 double cabins. Dayrooms, mess, galley, provision stores etc. are arranged as described in this specification. In addition, Offices, Conference rooms, Control rooms etc. shall equivalently be provided for as per description in this specification and General Arrangement drawing.
The corridors, stairs, exits, height to ceiling, room areas, ventilation, fire integrity of bulkheads and room arrangement as stated herein.

Deck covering in general is vinyl, using levelling mass where needed. The decks in galley, wardrobe/change room and provision stores are covered with casting and tiles.

Required thermal and fire insulation is provided in order to obtain fire integrity according to regulations. Insulation is applied on all outer steel bulkheads and the Vessel sides towards accommodation and internal steel bulkheads adjacent to weather exposed areas. The accommodation shall be built up by means of an approved steel panelling system with insulation and plastic surface.

Insulation is properly fitted below all weather exposed decks.

All furniture to be made of flame retardant materials.

Freezing/refrigeration Systems for Provisions

Refrigeration plant and Ventilation

The refrigeration plant consists of two fully automatic water-cooled compressors. Each compressor is dimensioned for an air temperature of 40°C and is able to serve as backup for each other. R-404a as cooling medium.

Two freezing, two cooling- and one dry provision room to be arranged on main-deck.

Freezing room

Size	Approx. 29 and 39 m².
Temperature	-22°C. Evaporator of forced draft type.

Cool room

Size	Approx. 29 m² each.
Temperature	+4°C. Evaporator of forced draft type.

Dry provisions room

Size	Approx. 114 m²
Temperature	Approx. +14 °C Evaporator of forced draft type.

Fresh air from main HVAC unit.

Personnel Lifts

Personnel lift

1 off	Personnel lift suitable for transporting min. 6 persons or transporting a stretcher

The lift is arranged from main deck to wheelhouse.

Provisions lift

1 off	Provisions lift suitable for transporting supplies from dry provisions room to the galley

Shore Gangways

2 off Gangway are installed on shelter deck .The gangway shall form a weather-tight closed gate at ship side. The starboard gangway to be hydraulic operated and include an in-place hydraulic operated accommodation gangway

Helicopter deck

1 off Helicopter deck in aluminium is arranged on top of wheelhouse. Design helicopter to be Sikorsky S-92 with “D” value of 20.88m (ø26,1m) and max weight of 12,8t.

Lights and communication according to class and the following regulations:

- UK CAA: CAP437
- UKOOA Guidelines for helideck
- Norwegian CAA
- SOLAS
- International Chamber of Shipping (ICS) Guide to helicopter/Ship operations
- National regulations

Sanitary Systems

Sanitary supply systems

2 off FW hydrophone pumps
2 off UV-steriliser
2 off Hot water circulation pump
1 off Chloride system
1 off Hot water boiler

Sanitary discharge systems

1 off Vacuum sewage plant, consisting of 2 pumps
1 off Sewage treatment plant with sewage transfer pump
1 off Sewage tank as hull tank
1 off Sewage discharge pump – 20m^3/h – 2bar

Sewage discharge pump is arranged for discharge to deck PS and SB with IMO flange and overboard below ballast water line.
Grey water from washstands and scuppers to discharge to sewage treatment plant or directly to sewage tank.

Ventilation, AC and Heating

Areas in general are fitted with satisfactory ventilation, heating and cooling according to ISO standards for ‘Design conditions and basis of calculation’.

Design conditions

Summer: Outdoor air temperature +40 C° (96% humidity)
Indoor air temperature +22 C° (60% humidity)

Winter: Outdoor air temperature –19 C°
Indoor air temperature winter +22 C°

HVAC plant for accommodation

An air conditioning plant for accommodation consisting of two HVAC-Unit based on a single spiro duct supply system is installed. The units to have a heating section based on hot water from boiler / engine heat recovery system as heating and a cooling section based on chilled water from the cooling plant as cooling medium. The units are mounted in separate AC-rooms on A- and E-deck.

HVAC plant for Bridge

A similar HVAC-unit is arranged for the bridge. The unit is located in a separate AC-room at the wheelhouse top

HVAC plant for Galley

A separate HVAC-unit is arranged for the galley. The unit is located in a separate AC-room on A-deck.

Cooling plant

3 off Chilled water plant units are installed. Each plant consist of 2 off approx. 50% compressors, 2 off condensers with common chiller.

Cooling medium for compressor according to class and regulations.

Diff. cooling units

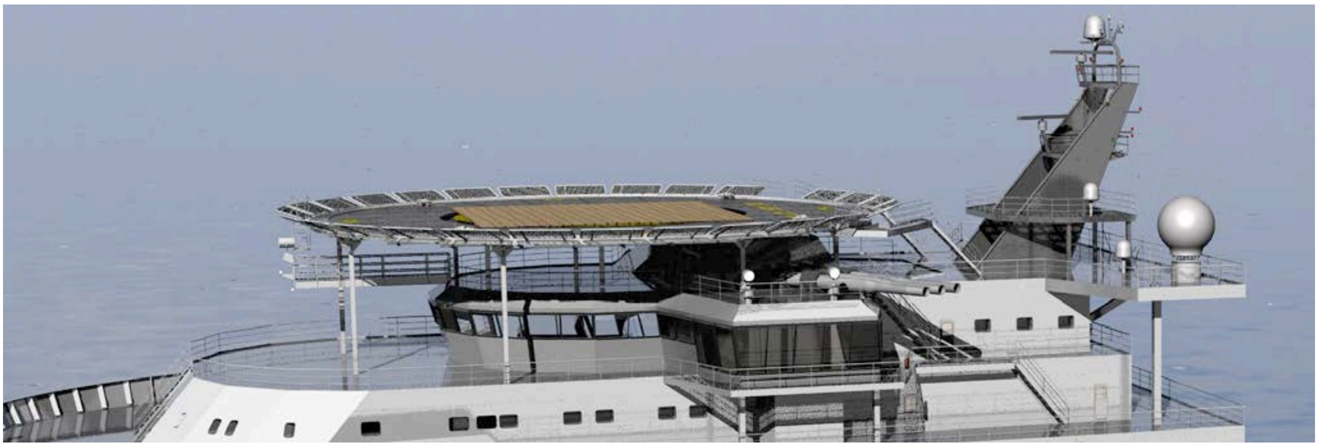
1 off Cooling unit for galley. The unit is self-contained and water cooled.
1 off Cooling unit for engine control room. The unit is self- contained and water-cooled.
1 off Cooling unit for each bow thruster room. The units are self-contained and water-cooled.
1 off Cooling unit for each main propulsion room. The units are self-contained and water-cooled.
1 off Cooling unit for DP-3 station. The unit is self-contained and air-cooled.
1 off Cooling unit for ROV equipment room. The unit is self- contained and air-cooled.
1 off Cooling unit for each switchboard room. The units are self- contained and water-cooled.
The cooling units are connected to the chilled water plant.

Ventilation fans for engine room

6 off Supply fans with speed control and sound trap for engine room.

Ventilation fans for other rooms

Other supply and exhaust fans for room and spaces with capacity as required.



The engine, propulsion and side thrusters’ room is divided into separate compartments according to DPS-3 requirements. The systems are also fully segregated in three independent systems. (DPS-3 requirements states minimum two systems)

Main Diesel Generator Sets

2 off Main diesel generator sets
Capacity approx. 2420 ekW, 900 rpm.

4 off Main diesel generator sets.
Capacity approx. 3640 ekW, 900 rpm.

Total Main generator power is approx. 19400 ekW.

Electrical Motors for Propulsion

3 off Electrical motors with frequency converters.
Motors are approx. 3300ekW, 0 – 750 rpm and FW cooled.

Propellers, Transmissions

3 off Azimuth thrusters with fixed propeller and nozzle.
360 deg. rotation angle.

Propeller diameter approx.: 3400 mm
The drive shaft is equipped with simple locking device to avoid wind-milling during repairs.

Central Heating and Boilers

1 off Hot water boiler, 750 000 kcal/h, oil fired with electrical heater, 4 x 10 kW.
Hot water boiler secondary system is used for tank washing and heating of air condition plant.

Emergency Diesel Generator Set

1 off Emergency generator set, approx. 1360 ekW at 1800 rpm.
440V, 60Hz
The engine is radiator-cooled.

All systems described in this chapter in general are divided into three systems. (DPS-3 requirements states minimum two systems)

Fuel Oil System

Engines to use fuel oil type marine gas oil according to ISO 8217, ISO-F-DMA. A complete FO overflow system with dedicated overflow tank is installed.

3 off FO service tanks as hull tank
3 off FO settling tank as hull tank
1 off FO service tank for Emergency generator set.
Capacity according to Class requirement
3 off FO separators, self-cleaning type with capacity according to engine make
3 off FO filter separator units
3 off FO transfer pumps (15 m³/h - 3 Bar)
1 off FO bulk transfer pump (120 m³ - 3 Bar)

Lubricating Oil System

3 off LO separator, self-cleaning type with capacity according to engine make
1 off LO filter separator unit for each engine
1 off Portable water separator for thrusters
3 off LO transfer pump for main gen. set, capacity approx. 2.8 m³/h and 6 bar
1 off LO transfer pump for main azimuth thrusters, capacity approx. 2.9 m³/h and 6 bar
1 off LO transfer pump, portable and air driven. Capacity approx. 2.4 m³/h

Cooling System

2 off Sea inlets (1 of low suction and 1 of high suction) are arranged in engine room. Sea inlets are connected with tank duct below tank top
3 off Sea inlet in aft ship
1 off Sea inlet in main winch room, for cooling of miscellaneous equipment

SW / FW cooling system for each main generator set.
SW / FW cooling system for propulsion plant aft, one for each system.
SW / FW cooling system for miscellaneous equipment and aux. generator set, one for each side.

Compressed Air Systems

3 off Starting air compressors according to Class requirement.
3 off Starting air bottles.
2 off Working air compressor with dryer, capacity approx. 200 m³/h at 7 bar.
2 off Working air bottles.
3 off Instrument air bottles.
6 off Instrument air dryers.

Exhaust System

Silencers for engines with 35 dB (A) noise reduction.
All exhaust pipes above casing top are stainless steel.

Distilled and Make-up Water Systems

2 off Fresh water generator, capacity approx. 25 t/24h
1 off FW reverse osmosis plant, capacity approx. 45 t/24h

Rehardening filter is installed between FW plant and dedicated FW tank.

Automation Systems for Machinery

2 off Workstations in the engine control room.
1 off Pilot chair on bridge fwd with electrical remote controls in the armrests.
1 off Electrical remote controls in the aft console/DP.
1 off Emergency DP-bridge on E-deck.

Integrated Automation System (IAS)

The Integrated Vessel Control consists of the following functionality and subsystems;

Integrated Alarm and Monitoring System
Cargo handling / Control (IAS).
Power Management System (PMS) interface
Auxiliary engine system automation. .

Each subsystem shall be separately operational but be integrated by means of a bus system. All three sub systems shall use same type and maker of PLC hardware.

The Integrated Alarm and Monitoring system with Cargo handling / Control consist of the following;

2 off Operator stations on bridge.
2 off Operator stations in ECR, each with 2 monitors.
1 off Alarm printer.
1 off Log printer.
9 off Extension Alarm panels for bridge, mess, cabin for E0 class.

The operator stations will be connected to the two main processor control stations by a redundant bus network.

The IAS connected to;
All propulsion and thrusters converters
PMS
Main engines
All frequency converter driven pumps (cargo)
Sounding / Tank level system.
All remote operated valves
Power Management System
GPS
VDR

The I/O’s are collected by the use of the remote I/O stations. The remote I/O connected to the main processor control stations. Total amount of I/O are approx. 3500.

Ballast System

2 off Ballast pump, with frequency controlled electric driven motor. Capacity approx. 250 m³/h – 3 Bar
1 off Ballast/general purpose pump, with frequency controlled electric driven motor. Capacity approx. 230 m³/h – 9 Bar

Ballast Water Treatment

A class and authorities approved ballast water treatment system with the same capacity as one ballast water pump is installed.

Bilge System

3 off Bilge pumps according to class requirement.
2 off Bilge water holding tanks.
1 off Bilge water drain tank.
1 off Bilge water settling tank in engine room,
2 off Bilge water separator, capacity each

	approx. 2.5 m³/h – 5 ppm & OCD alarm.
1 off	Sludge pump , 2-speed, capacity each approx. 10 / 5 m³/h and 6 bar.
1 off	Bilge ejector for room forward above main deck. Capacity approx. 12 m³/h.

Gutter Pipes, Outside Accommodation

Sufficient number of drain pipes is laid from respective decks.

Fire Fighting System

2 off	Fire pumps according to Class requirement.
1 off	Emergency fire pump according to Class requirement
1 off	Pressure holding pump
1 off	General fire pump
1 off	Protection system of water mist type for engine rooms
1 off	Sprinkler nozzle in Paint-/ Chemical store from hydrophone line
1 off	Fire fighting system for Galley
1 off	Fire fighting system for Switchboard room
1 off	Fire alarm system

Fire fighting systems for helicopter deck

1 off	Pop-up protection system according to Class and Authorities requirements

Fire & Gas Detection System

The vessel has been divided into 6 main detection zones (A1-A6), each zone fitted with fire & gas system detectors and dampers arrangement. Each zone has a number of fire detectors of various types and/or a number of gas detectors. Actions in the event of fire/gas being detected have also been defined based on equipment in, and ventilation to and from the areas.

The F&G system is implemented in a dedicated ABB Safeguard 800 series controller; this is an integral part of the Høglund Advant IAS system. The F&G system is based on a redundant 1 out of 2 voting concept.

Emergency Shutdown System

An emergency shutdown system with both automatic and a 3 level manual shutdown is integrated to the fire & gas detection system.

Air and Sounding System

A remote tank sounding system with electronic reading is installed. The system is interfaced to the IAS system,
Air pipe size according to Class requirement.
Workmanship for air and sounding pipes according to Yard standard.

Video Monitoring Equipment

Colour video camera system consists of:

20 off	Video cameras (2 off engine room, 2 off equipment room, 3 off propulsion room, 2 off switchboard room, 2 off crane winch compartment, 2 off ROV hangar, 1 under helideck, 1 off E-deck aft, 1 off under crane, 2 off bridge wings with, 1 off mast top)
1 off	Video switching matrix
5 off	Camera operation stations
5 off	Monitors on the bridge
3 off	Monitors in the ECR
1 off	Monitor in the crane cabin
2 off	Monitors in the ROV control room
4 off	Monitors at the survey desk
2 off	Monitors at each operation office displaying ROV images and selected deck cameras

The video monitoring system is interfaced with the ROV system.
9 off cameras and 3 off ROV-cameras have modulators with TV-channels on the TV/radio antenna distribution system.

Common Electric and Electronic Systems

The Vessel electrical power system and remote controls are fully segregated in to three independent systems according to DPS-3 requirements.

The ships electrical power is generated by the main generator sets. The power supplies are divided into 6 voltage ranges:

6600 VAC, 60 Hz	220 VAC, 60 Hz
690 VAC, 60 Hz	110 VAC, 60 Hz
440 VAC, 60 Hz	24 VDC

The Vessel electrical main power system and remote controls are fully segregated in to three independent systems in accordance with the 3-split design philosophy.

Moulded Case Circuit Breakers (MCCB) is used for all power distribution circuits.

6600 VAC Main switchboard
The generators have the voltage level 6600 V and feed the main switchboard. The main switchboard is supplying main propulsion and thruster motors and the lower range switchboards.

Further, the 6600 V switchboard is designed for operation in DPS-3 mode with closed bus-ties.

The over current, short-circuit, differential and reverse power protection are according to class regulations.

There will be three methods of synchronising the generators and the bus tiebreaker.

Automatic synchronising:
The PMS controls the engine speed. When the phase, voltage and frequency are correct the synchronisation controller closes the breaker.

Manual synchronising:
The selector switch for the generators/ bus tiebreaker is in manual mode. An indication lamp indicates correct phase and frequency. Activate the push-button and the bypass button activates the breaker.

Semi-automatic synchronising:

The selector switch for the generators/ bus tie breaker is in manual mode. The selected generator/ bus tie breaker is synchronised to the bus bar by means of a semi-automatic synchronise controller located in the bus tie cell. Activation of the push button activates the breaker.

The 6600 V main switchboards are equipped with a total of 3 off spare breakers (cubicles) for testing purposes and future equipment

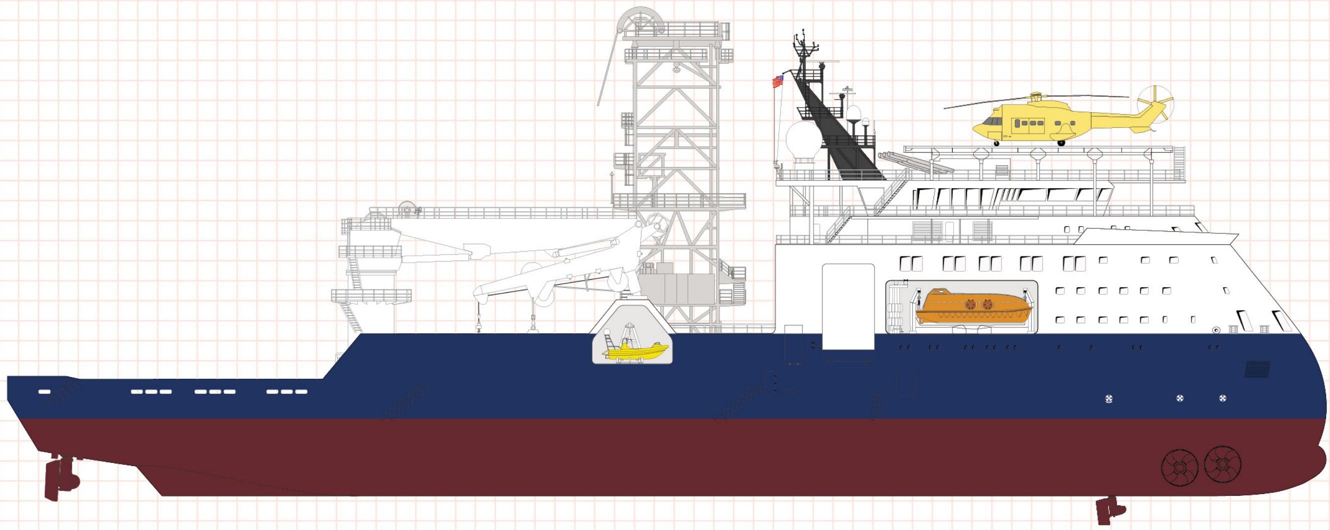
690 VAC for main propulsion and thrusters
The main propulsion and thrusters electrical drive system are fed from the 6600 V main switchboard through 6600 V / 690 V transformers.

690 VAC Offshore switchboard
The 2 off offshore switchboards are supplied from the 6600 VAC main switchboard through separate 4200 kVA transformers. These switchboards supply the offshore crane, ROV systems, ROV LARS in addition to future deck equipment.

440 VAC General purpose switchboard
The 440 VAC main switchboards are supplied from the 6600 V AC switchboard through transformers. The 440 VAC main switchboards are intended for various pumps, power packs large electrical heaters, deck equipment, steering gear and ventilation fans.

220 VAC General purpose switchboards
The 220 VAC main switchboards are supplied from the 440 V AC switchboards through transformers. The 220 VAC main switchboards is intended for lighting, navigational equipment,
radio, electronics and low power heating.

110 VAC General purpose switchboard
The 110 VAC main switchboards are supplied from the 440 V AC switchboards through transformers. The 110 VAC main switchboards is configured as a live-neutral system intended for domestic consumers such as computers, handheld tools, TVs portable lights etc.



M/V ISLAND PERFORMER

426.5′ OFFSHORE CONSTRUCTION AND LIGHT WELL INTERVENTION VESSEL

EDISON CHOUEST OFFSHORE

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

REGISTRATION

Vessel Type	Offshore Construction and Light Well Intervention Vessel
Year Built	2014
IMO	Class III for Dynamic Positioning
IMO	

DIMENSIONS

Length Overall	426.51 ft. (130.0 m)
Breadth Moulded	82.02 ft. (25.0 m)
Freeboard (Maximum Draft)	7.87 ft. (2.4 m)
Main Deck Area Aft	8,611.13 sq. ft. (800 sq. m)
Shelter Deck Area	9,687.52 sq. ft. (900 sq. m)
Gross Tonnage	12,983 GRT
Net Tonnage	3895 NRT
Deadweight Tonnage	6974 LT (7088 t)
Design Draught	22.97 ft. (7.0 m)
Draught (Max)	24.93 ft. (7.6 m)
Length Between Perpendiculars	400.59 ft. (122.1 m)
Depth to Main Deck	32.81 ft. (10.0 m)
Freeboard at Design Draught	9.84 ft. (3.0 m)
Total Deck Area Aft of Hanger	17,760.45 sq. ft. (1,650 sq. m)

CAPACITIES

Fuel Oil	554,761.28 gallons (2,100 m3)
Ballast/Drill Water	1,743,535.45 gallons (6,600 m3)
Potable Water	277,380.64 gallons (1,050 m3)
Anti-Heeling/Ballast Water	209,224 gallons (792 m3)
Lube Oil	21,133.76 gallons (80 m3)
MEG	124,160.86 gallons (470 m3)
Hydr. Oil	8981.85 gallons (34 m3)
Sewage	39.625.81 gallons (150 m3)
Bilge/Sludge/Drop Tank	15,850.32 gallons (60 m3)

MACHINERY

Main Propulsion	Three (3) x 3,000 kW at 1,200 rpm
Bow Thrusters	Two (2) x 1,920 kW at 900 rpm electric driven tunnel thrusters
Azimuth Thrusters	One (1) x 1,500 kW at 1,800 rpm swing-up compass thruster
Speed	14.5 knots
Generators	Six (6) diesel generators sets, approx. 2,700 ekW, 900 rpm each
Emergency Generators	500 ekW at 1,800 rpm

TOWING AND ANCHOR HANDLING (DECK EQUIPMENT)

Tugger Winches	10 t pull at first layer, 30 m/min.
Drums	Capacity approx. 225 m of 24 mm wire

SPECIAL FEATURES

Positioning	DP-3
Cranes	250 t at 14 m outreach, 3,000 m wire
Cranes	20 t at 40 m outreach, 500 m wire
Moon Pool	26.25 ft. x 26.25 ft. (8.0 m x 8.0 m)
Helideck	D value 20.88m / t value = 10.8 t / Rated for Sikorsky S-92 Helicopter
Anti-Roll Tanks	4 Passive anti roll Tanks
Anti-Heeling System	3 sets of tanks with independent pumps; controlled by Hoppe Bordmesstechnik GmbH Anti Heeling System
Module Handling Tower Winch	AHC 140/230 ton (2,500 m wire)

ROV

ROV	Two (2) Schilling UHD 200 hp

LIFE SAVING EQUIPMENT

Life Rafts	Four (4) x 35-man life rafts
Life Boat	Two (2) x 130-man capacity
Ring Buoys	Twenty (20) x Life Rings
Firesuits	Six (6)
Other gear as required by authorities	

ELECTRONICS

Electronics Package	Seatex DPS 700, BM Veripos LD6-GG2 DGPS, Ranger Pro 2 USBL with HPT 5000 Transceiver, Ranger Pro 2 USBL with HPT 7000 Transceiver, BM Mini RadaScan, Two (2) Spot Beam, Three (3) Static wind sensors, Three (3) Mition reference units, Three (3) Gyro compass, s-band ARPA radar, X-band ARPA radar, ECDIS charting system, GPS, Autopilot, Navigation echo sounder, Doppler speed log, Sound reception system, AIS, VDR, Conning computer system, Bridge alarm system, Watch monitoring system, SSAS, Two (2) GMDSS, MF/HF SSB radio station, Navtex receiver, EPIRBS, TWO (2) SATCOM-C, Inmarsat Fleet-77, Global star speech/9600 baud data, Two (2) Simplex VHF with DSC

CLASSIFICATION

SOLAS	
DNV + 1A1	
EO	
Dynpos AUTRO	
Clean Design	
COMF-V (1)	
COMF C3	
HELDK-SH	
NAUT-AW	
SF	
DK+	
HL	(2, 8)
SPS	
OPP-F	
CRANE	
BIS	

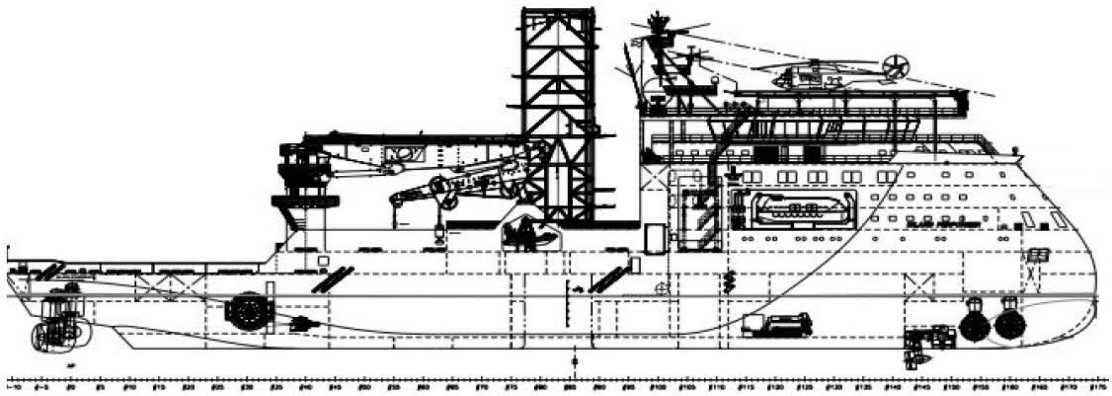
ACCOMMODATIONS

Accommodations	130

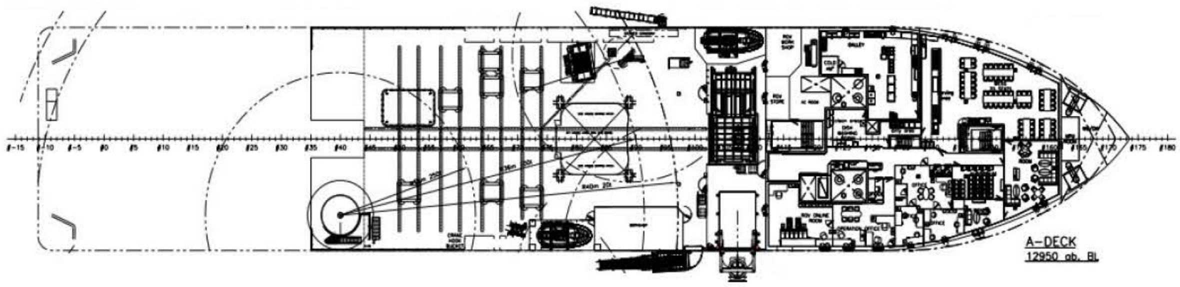
M/V ISLAND PERFORMER

Schematics

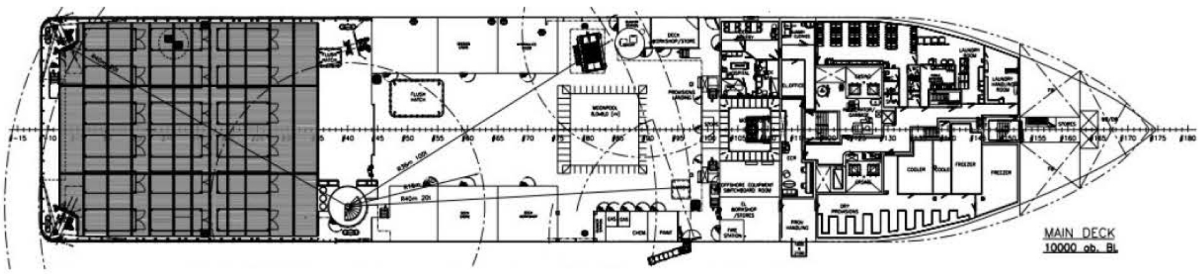
Profile



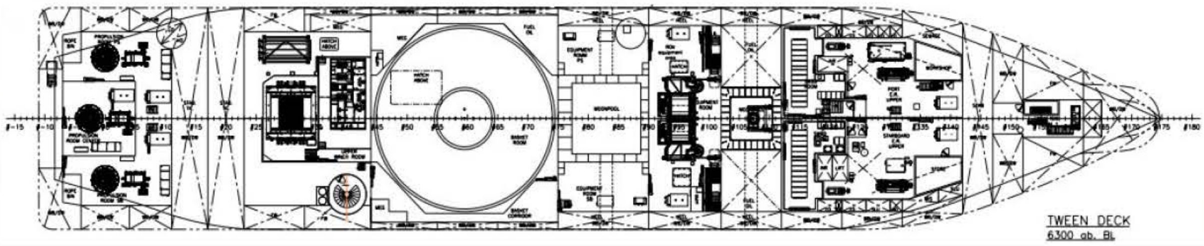
A - Deck



Main Deck



Tween Deck



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

EDISON CHOUEST OFFSHORE

Appendix F: Coastal Zone Management Certifications (AL)

Coastal Zone Management Consistency Certification
State of Alabama

Development Operations Coordination Document
Type of OCS Plan

Mississippi Canyon Block 562
Area and Block

OCS-G 19966 Lease Number

November 2020

CSA-bp-FL-20-81485-3606-03-REP-01-FIN

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

BP Exploration & Production, Inc.
____
Lessee or Operator

Betsy Cleland
____
Certifying Official

12/04/2020
____
Date

Evaluation of Consistency with Alabama Enforceable Policies

1 Background

BP Exploration & Production Inc. (bp) is submitting a Development Operations Coordination Document (DOCD) to the Bureau of Ocean Energy Management (BOEM). Under this DOCD, bp proposes to install a single tie-back from the Isabela-3 well to a spare hub at the existing subsea facilities at the Galapagos oil loop. The well will be tied back to the existing Isabela pipeline end manifold via a rigid jumper of 18 to 30 m (60 to 100 ft). A new subsea metering skid (SMS) will tie into the existing Isabela umbilical termination assembly via flying leads to route hydraulics and chemicals to the Isabela-3 subsea tree. Chemical metering will be configured in the SMS to share chemicals between the Isabela-2 and Isabela-3 wells. The installation activities will occur in MC 562. A dynamically positioned construction vessel is anticipated to be on site for approximately 3 days for subsea tree installation and 18 days for installation and commissioning in the third quarter of 2021.

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 § 550.212(o) and § 550.227 as well as Notice to Lessees and Operators (NTL) 2008-G04, extended by NTL 2015-N02 and partially amended by 2020-G01.

MC 562 is located within the Central Gulf of Mexico Outer Continental Shelf (OCS) Planning Area, approximately 120 statute miles (193 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.

2 Evaluation

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

3 Consistency Certification

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

Table 1. Evaluation of the Revised Development Operations Coordination Document (DOCD) 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 120 statute miles (193 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 120 statute miles (193 km) from the nearest Alabama shoreline and do not include any extraction of minerals from the Alabama coastal zone.	Yes
Commercial Fishing	DOCD Appendix D – EIA (C.8.1 Recreational and Commercial Fishing)	Routine activities are not anticipated to affect commercial fishing in Alabama's coastal zone. Routine activities may have limited environmental impacts in Federal OCS waters, approximately 120 statute miles (193 km) from the nearest Alabama shoreline. 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 hydrocarbon 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 a large hydrocarbon spill (fuel) on Alabama's coastal zone are analyzed in the EIA. In the event of such a spill bp, along with its contractors, will implement the plans and procedures of their Regional Oil Spill Response Plan (OSRP). The precautions addressed in bp's standard safety and environmental operating procedures and Regional OSRP are consistent with the protection of Alabama's fishery resources and commercial fishing industry.	Yes
Coastal Hazard Management	DOCD Section 3 – Geological and Geophysical Information DOCD Section 9 – Oil Spill Information DOCD Appendix D – EIA (D. Environmental Hazards)	Site clearance surveys indicated seafloor conditions are suitable for proposed activities in the lease block. Routine activities are not anticipated to increase the susceptibility of the Alabama's coastal zone to natural hazards due to the location of the proposed activities in Federal OCS waters, approximately 120 statute miles (193 km) from the nearest Alabama shoreline. No new development in coastal areas, construction, dredging, or filling on Alabama's lands or waters are anticipated. In the event of a spill, bp will implement the plans and procedures of its Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize shoreline erosion.	Yes

Table 1. (Continued).

Policy	Cross Reference to the DOCD	Comments	Consistent with ACAMP Policies? (Yes/No)
Shoreline Erosion	DOCD Appendix D – EIA (C.7 Coastal Habitats and Protected Areas)	Routine activities are not anticipated to affect Alabama's shoreline due to the location of the proposed activities in Federal OCS waters, approximately 120 statute miles (193 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. 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 DOCD Appendix D – 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 lease area. bp operations along with its contractors have a marine trash and debris program, in addition, compliance with NTL BSEE-2015-G03 will minimize the chance of trash or debris being lost overboard and subsequently washing up on beaches. In the event of a spill, bp and its contractors will implement the plans and procedures of their Regional OSRP. The precautions addressed in bp's standard safety and environmental operating procedures and its Regional OSRP are consistent with the ACAMP policy of safeguarding public access to coastal lands and waters for recreation.	Yes
Transportation	DOCD Section 11 – Lease Stipulations DOCD Appendix D – 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 and its contractors intend comply with the Bureau of Ocean Energy Management requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircrafts. No impacts on Alabama transportation routes or infrastructure are expected to occur.	Yes
Natural Resource Protection Policies			
Biological Productivity	DOCD Section 7 – Wastes and Discharges Information DOCD Section 9 – Oil Spill Information DOCD Appendix D – (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 120 statute miles (193 km) from the nearest Alabama shoreline. bp will potentially use onshore support facilities in Alabama. In the event of a spill, bp will implement the plans and procedures of its Regional OSRP. The precautions addressed in bp's standard safety and environmental operating procedures and its Regional OSRP are consistent with the ACAMP policy of protecting and preserving biologically productive coastal habitats.	Yes

Table 1. (Continued).

Policy	Cross Reference to the DOCD	Comments	Consistent with ACAMP Policies? (Yes/No)
Water Quality and Water Resources	DOCD Section 9 – Oil Spill Information DOCD Appendix D – 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 120 statute miles (193 km) from the nearest Alabama shoreline. All discharges for the proposed activity will be governed by a National Pollutant Discharge Elimination System General Permit or a Vessel 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. In the event of a large fuel spill, bp and its contractors will implement the plans and procedures of their Regional OSRP. The precautions addressed in bp's and its contractors' standard safety and environmental operating procedures and its Regional OSRP are consistent with the core policies of conserving surface and ground waters for full beneficial use.	Yes
Air Quality	DOCD Section 8 – Air Emissions Information DOCD Appendix D – EIA (C.1.1 Air Quality)	Routine activities are not anticipated to affect Alabama's coastal air quality. The proposed activities will be conducted in Federal OCS waters, approximately 120 statute miles (193 km) from the nearest Alabama shoreline. In the event of a large fuel spill, bp and its contractors will implement the plans and procedures of their Regional OSRP. The precautions addressed in bp's and its contractors' standard safety and environmental operating procedures and its Regional OSRP are consistent with the protection of coastal air quality.	Yes
Wetlands and Endemic Submerged Aquatic Vegetation	DOCD Section 6 – Biological, Physical, and Socioeconomic Information DOCD Section 9 – Oil Spill Information DOCD Appendix D – 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 120 statute miles (193 km) from the nearest Alabama shoreline. bp may potentially use onshore support facilities in Alabama. However, there will be no new construction, dredging, or filling on Alabama's lands or waters that could affect wetlands or submerged seagrass beds. In the event of a large fuel spill, bp and its contractors will implement the plans and procedures of their Regional OSRP. 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 DOCD Section 9 – Oil Spill Information DOCD Appendix D – 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 120 statute miles (193 km) from the nearest Alabama shoreline. bp may potentially use onshore support facilities in Alabama. However, there will be no new construction, dredging, or filling on Alabama's lands or waters that could weaken, damage, or destroy the integrity of the coastal areas or cause erosion of beaches or dunes. In the event of a large fuel spill, bp and its contractors will implement the plans and procedures of their Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize shoreline erosion and impacts on beach and dune systems.	Yes
Wildlife Habitat Protection	DOCD Section 6 – Biological, Physical, and Socioeconomic Information DOCD Section 9 – Oil Spill Information DOCD Appendix D – 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 120 statute miles (193 km) from the nearest Alabama shoreline. bp may potentially use onshore support facilities in Alabama. However, there will be no new construction, dredging, or filling on Alabama's lands or waters that could affect coastal wildlife habitats, including critical habitats for endangered or threatened species. In the event of a large fuel spill, bp and its contractors will implement the plans and procedures of their Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts on wildlife habitats.	Yes
Threatened and Endangered Species	DOCD Section 6 – Biological, Physical, and Socioeconomic Information DOCD Section 9 – Oil Spill Information DOCD Section 10 – Environmental Monitoring and Mitigation Measures DOCD Appendix D – 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 120 statute miles (193 km) from the nearest Alabama shoreline. bp may potentially use onshore support facilities in Alabama. However, there will be no new construction, dredging, or filling on Alabama's lands or waters that could affect endangered or threatened species or their coastal wildlife habitats. In the event of a large fuel spill, bp and its contractors will implement the plans and procedures of their Regional OSRP. Any cleanup or recovery activities in Alabama would be conducted using applicable best management practices to minimize impacts on endangered and threatened species and their habitats.	Yes

Table 1. (Continued).

Policy	Cross Reference to the DOCD	Comments	Consistent with ACAMP Policies? (Yes/No)
Cultural Resources Protection	DOCD Section 6 – Biological, Physical, and Socioeconomic Information DOCD Section 9 – Oil Spill Information DOCD Appendix D – 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 120 statute miles (193 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. In the event of a large fuel spill, bp and its contractors will implement the plans and procedures of their Regional OSRP. 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.

4 References Cited

Alabama Department of Conservation & Natural Resources. 2017. Alabama Coastal Area Management Program IV. Alabama Department of Conservation & Natural Resources. State Lands Division. Coastal Section, Spanish Fort, AL. 31 pp. https://www.outdooralabama.com/sites/default/files/Lands/Coastal/ACAMP%20IV%20-%20FINAL%20approved%20-%20Jan%2025%202017.pdf

National Oceanic and Atmospheric Administration and Alabama Coastal Area Board. 1979. The Alabama Coastal Area Management Program and Final Environmental Impact Statement. National Oceanic and Atmospheric Administration. Office of Coastal Zone Management, Washington, DC and Alabama Coastal Area Board, Daphne, AL. 411 pp. https://www.govinfo.gov/content/pkg/CZIC-td194-56-a2-f56-1979/pdf/CZIC-td194-56-a2-f56-1979.pdf

Appendix G: Service Processing Fee

From: notification@pay.gov
To: Cleland, Betsy
Subject: Pay.gov Payment Confirmation: BOEM Development/DOCD Plan - BD
Date: Friday, November 20, 2020 3:00:29 PM

An official email of the United States government

Pay.gov logo

Your payment has been submitted to Pay.gov and the details are below. If you have any questions regarding this payment, please contact Brenda Dickerson at (703) 787-1617 or BseeFinanceAccountsReceivable@bsee.gov.

Application Name: BOEM Development/DOCD Plan - BD
Pay.gov Tracking ID: 26QGOA41
Agency Tracking ID: 76051920262
Transaction Type: Sale
Transaction Date: 11/20/2020 04:00:21 PM EST
Account Holder Name: Betsy Cleland
Transaction Amount: $4,238.00
Card Type: MasterCard
Card Number: ************8137

Region: Gulf of Mexico
Contact: Betsy Cleland 281-773-9088
Company Name/No: BP Exploration & Production Inc., 02481
Lease Number(s): 19966, , , ,
Area-Block: Mississippi Canyon MC, 562: , : , : , : ,
Type-Wells: Supplemental Plan, 1

THIS IS AN AUTOMATED MESSAGE. PLEASE DO NOT REPLY.